

ANNUAL REPORT
OF THE
Board of State Viticultural Commissioners
FOR
1889-90.

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Chas. A. Warren Jr.
N. E. House.

ANNUAL REPORT

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Board of State Viticultural Commissioners,

FOR 1889-90.



SACRAMENTO:

STATE OFFICE, : : : : : J. D. YOUNG, SUPT. STATE PRINTING.
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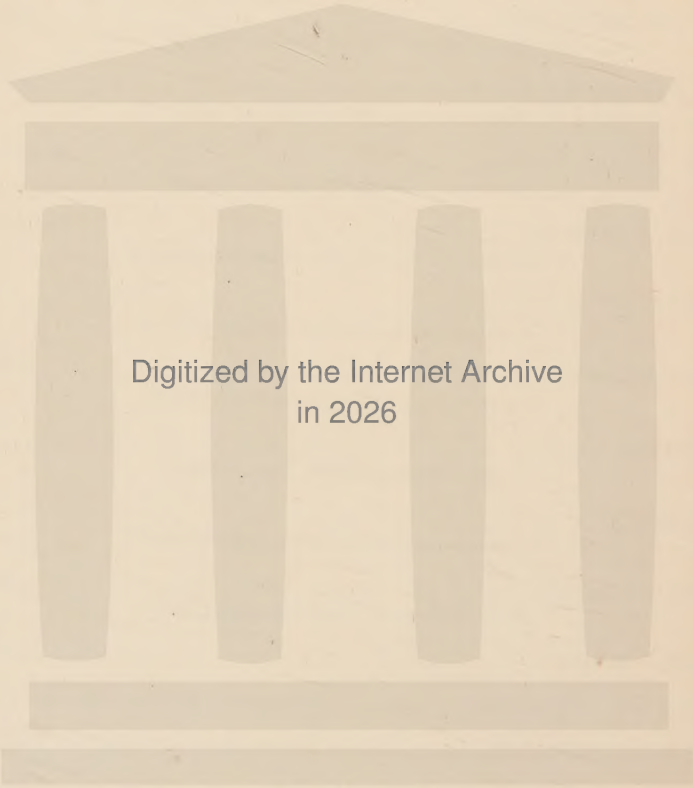
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OFFICERS AND MEMBERS OF THE BOARD.

ISAAC DeTURK, President.....	Santa Rosa.
Commissioner for the Sonoma District.	
J. DeBARTH SHORB, Vice-President.....	San Gabriel.
Commissioner for the State at Large.	
JOHN T. DOYLE, Treasurer.....	San Francisco.
Commissioner for the State at Large.	
CHARLES BUNDSCHU.....	San Francisco.
Commissioner for the San Francisco District.	
GEORGE WEST.....	Stockton.
Commissioner for the San Joaquin District.	
R. D. STEPHENS.....	Sacramento.
Commissioner for the Sacramento District.	
E. C. PRIBER.....	Napa.
Commissioner for the Napa District.	
L. J. ROSE.....	Los Angeles.
Commissioner for the Los Angeles District.	
G. G. BLANCHARD.....	Placerville.
Commissioner for the El Dorado District.	
WINFIELD SCOTT.....	Secretary.
CLARENCE J. WETMORE.....	Manager of Hall and Experimental Cellar.
CHARLES A. WETMORE.....	Chief Executive Viticultural and Health Officer.

Office of the Board:

317 PINE STREET, SAN FRANCISCO.



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REPORT OF I. DETURK,

President of the Board of State Viticultural Commissioners, 1890.

SAN FRANCISCO, CAL., September 29, 1890.

To his Excellency R. W. WATERMAN, Governor of the State of California:

SIR: As required by law, I herewith transmit the financial report of the Board of State Viticultural Commissioners, showing the receipts and expenditures of the Board during the forty-first fiscal year.

Inclosed you will find a statement from Charles B. Turrill, as Secretary, in which the report will be found in detail.

Respectfully,

I. DETURK,

President of the Board of State Viticultural Commissioners.

SAN FRANCISCO, June 30, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully submit the following report of receipts and disbursements for the forty-first fiscal year, ending June 30, 1890, as taken from the books in this office:

RECEIPTS.

Amount appropriated by the Legislature for the forty-first and forty-second fiscal years, from July 1, 1889, to July 1, 1891	\$35,000 00
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DISBURSEMENTS.

Salaries	\$2,850 00
Lectures	600 00
Experimental work	2,794 21
Commissioners' expenses	64 80
Conventions	387 50
Library	110 00
Statistics	72 50
Distributing information	30 00
Office expenses	9,970 76
State Analyst	600 00
Total	17,479 77
Balance available for the forty-second fiscal year	\$17,520 23

Respectfully,

CHARLES B. TURRILL,
Secretary.

REPORT.

SIR: I herewith submit my annual report as President of the Commissioners. Accompanying it will be found reports from the various District Commissioners, and other documents necessary to set forth the work of the Commission for the fiscal year ending June 30, 1890.

During the past year several changes were made in the membership of the Board. The terms of Charles A. Wetmore as Commissioner for the San Francisco District, Charles Krug as Commissioner for the Napa

District, W. S. Manlove as Commissioner for the Sacramento District, and J. DeBarth Shorb as Commissioner for the State at Large, expired by limitation. Commissioner Shorb was reappointed to succeed himself, but the other vacancies were filled by new appointments. Chas. Bundschu was appointed as Commissioner for the San Francisco District, succeeding Mr. Wetmore; E. C. Priber was appointed for the Napa District, succeeding Mr. Krug; and R. D. Stephens was appointed for the Sacramento District, succeeding Dr. Manlove.

Charles A. Wetmore, having held the office of President of the Board, as well as that of Commissioner for the San Francisco District, the former office became vacant with the expiration of his term as Commissioner. At the annual meeting, held June 9, 1890, I was elected to fill the office of President. J. DeBarth Shorb was elected to fill the vacancy created by my election as President, and Commissioner John T. Doyle became Treasurer in place of Charles Krug. At the same time Winfield Scott was elected Secretary in place of Charles B. Turrill.

No other changes in the personnel of the Board or in its officers have taken place. With the retirement of Chas. A. Wetmore from the Board and the Presidency of the Board at the same time, he retained his connection with us as Chief Executive Viticultural Officer, which position he still holds.

The retiring Commissioners, Messrs. Wetmore, Krug, and Manlove, carried with them the best wishes of all the members of the Board. Two of them—Messrs. Wetmore and Krug—had been with the Board since its organization in 1880, while Dr. Manlove had been identified with it since 1887. Their faithfulness and earnest work did much to foster the viticultural industry in every portion of the State.

The wine industry is just recovering from a period of over three years of depression caused by the largely increased production consequent on the extensive planting in the years prior to 1886. Experience during the past decade has proved that while the demand for our wines is growing, it is not growing at such a rate as to warrant any period of extensive planting, such as has in the past been indulged in from time to time. It must be borne in mind that Americans are not a wine-drinking people, as neither soil nor climate in the most thickly populated portions of the country are suited for wine growing. Those of our countrymen east of the Rockies who do not drink whisky, drink beer, to which they are more accustomed than to wine. The people are, however, gradually recognizing the merits of our wines, and from this time forth there may be expected a steady increase in the consumption of vinous liquors. This, and the fact that comparatively no new vineyards of wine grapes can come into bearing for at least four years to come, is a sufficient guarantee of prosperity for the producers in the next few years.

The planting of wine grape varieties has been almost totally suspended since 1888, though a few vineyards have been set out here and there. On the other hand, large areas of these vines have been destroyed by various diseases. The Anaheim disease has cleared out between ten thousand and twelve thousand acres of vines in Southern California, and in Napa and Sonoma Counties many vineyards have succumbed to the phylloxera. These losses in the total area of land set to vines have been counterbalanced many times over by the extensive areas that have been planted to varieties suited for raisins and for table purposes.

Confidence, however, is being restored among the growers of wine

grapes and the makers of wine. An era of planting must soon begin under the increased demand for our wines. Experience with the phylloxera has taught the most progressive vineyardists that in all cases resistant stocks must be used, and experience in the wine markets shows the absolute necessity of grafting on only the finer varieties of grapes. We must and will have something better if the wines are to be accorded the degree of excellence for which all should strive. The importance of having only the finest varieties cannot be stated too strongly.

It must be remembered, too, that we have already had one great period of depression consequent upon overproduction, and that after it was past, viticulturists enjoyed their greatest years of prosperity. I refer here to the depression in the early seventies, which became so great that many vineyards were either abandoned or uprooted and replaced by grain fields or orchards. Yet in the early eighties, when the eastern market for our wines was only in its infancy compared to what it is now, prosperity prevailed in every section devoted to grape culture. The same will be true during the next few years, because there will be more drinkers of wine than there will be wine for them; and this period will last until the production once more reaches the ever increasing consumption in the States east of the Rocky Mountains.

This time, I believe, is far in the future. Our wines, which a few years ago were unknown, save by name, in nearly every eastern city of importance, can now be found in every city of size in the Mississippi Valley and on the Atlantic Slope. New York, Chicago, and New Orleans have become important distributing points, and branch houses or agencies have been established in those places by the principal producers and merchants. Not only this, but our wines and brandies are handled by wholesale dealers in cities of less importance. In a word, the facilities for distributing and selling our wines are infinitely better than ever before, and consequently our products are placed on sale in better form than ever before.

WORK OF THE COMMISSION.

The work of the Commission since the last report has been chiefly directed towards promoting the demand for and aiding the sale of our viticultural products. This policy has been pursued in every legitimate manner, and everything that could make friends for California wines and brandies has been done. But it must not be supposed that the other branches of our work have been neglected; on the contrary, we have continued to send out information on subjects connected with viticulture in all its branches. Not only this, but the Commission has continued its work in the experimental cellars, and has pursued several special investigations, notably the investigation conducted at San Gabriel by Prof. Ethelbert Dowlen into the causes and cure of the Anaheim disease. His report, to which especial attention is called, appears elsewhere.

Acting on the central line of policy, the Commissioners have had a series of lectures delivered in the principal eastern cities by Miss Kate Field, and have established a permanent exhibit in San Francisco, in connection with which a café is operated, in which wines and brandies of the producers and merchants can be sampled or compared.

Regarding the lectures of Miss Field, it must be said that they have exerted a very beneficial effect in stimulating the eastern demand for the best qualities of wines as well as for the ordinary grades. This

talented lady gave us all the benefits of her ability as a lecturer, and her personal influence. She was bitterly attacked by the Prohibitionists, as might have been expected, but her able efforts in inducing interest in and drinking of wines were productive of excellent results.

EXHIBIT AND CAFÉ.

A persistent and determined attempt is being made in some quarters to decry the value of the public exhibit in San Francisco, as a means of increasing interest in wines; and the café attached has been the subject of bitter and relentless attack without cause.

The Commissioners had several objects in view in establishing the permanent exhibit, and now, at the end of two years, it has proved an unqualified success.

I would call attention, in the first place, to the history of the exhibit, as bearing on its efficiency in carrying out the objects for which it was established.

At the meeting of the Commissioners, held June 11, 1888, the President, Charles A. Wetmore, brought up the subject, and after a full explanation by him, and a discussion by the members present, a committee was appointed to investigate the subject and report at a subsequent meeting. This committee, which consisted of Commissioners Wetmore, Shorb, and DeTurk, met at once, and on the following day reported their plans for the operation of such an exhibit.

The details for the display of wines and brandies were easily arranged, but the matter of providing a sampling department, free from all possible objection by the public and by the producers of wine, or wine merchants, was a more difficult matter.

It was finally decided that all producers and dealers should have equal rights and privileges in the exhibit; that their wines should be sold at the prices fixed by themselves; that after deducting necessary cost of retailing in the café (corkage, etc.), the money realized from the sale of the wines should be returned to the exhibitors; *that no exhibitor be allowed to fix his prices so as to come into unfair competition with the ordinary retail trade; that all undercutting of fair trade prices be discouraged by strict rules, and that visitors be guided solely by the catalogue in making selections of wine.*

At the same time it was decided to enlarge the scope of the experimental cellar.

These rules have been strictly adhered to in all cases.

At a meeting of the Board, held October 26, 1888, President Wetmore stated that the arrangements looking to the establishment of the exhibit in a room in the Mechanics' Institute building, on Post Street, had fallen through, in lieu of which he had engaged Platt's Hall, at 216 Montgomery Street. This action was indorsed. Considerable time was spent thereafter in making the necessary alterations in the hall so as to adapt it to the purposes of the Commission. The last months of 1888 were spent in gathering exhibits, and in January, 1889, the hall was opened with a fine representation of wines and brandies from every section of the State, and with a café attachment, which was managed with the ends of the Commission constantly in view.

Since the opening, the hall has been visited by thousands of sight-seers from California, the East, Europe, Australia, China, and Japan,

Mexico, and Central and South America. These visitors have been shown every courtesy, and the café has proved a most valuable adjunct in this connection in introducing them directly to our wines and brandies. It is only fair to state that in our rooms—and in them only—have intending buyers of California wines and brandies been able to find a representative collection of our products, for not only are the merchants represented, but the producers from every section:

In the operation of this feature of our work, we have left behind every consideration of personal gain, and acted solely for the interests of all, no matter of which class. The café to-day is not and never has been a money-making institution, either for the Commission or for those whose wines are on exhibit. But its influence in fostering a demand for our wines, in showing visitors and buyers what each producer or merchant has to offer, in generally stimulating interest in California products, whether at home or abroad, has been so marked that I would most earnestly recommend that the means be provided by which a similar viticultural exhibit be opened in New York, with a café attached, and, if possible, in Chicago and London.

No better means of advertising the products of *all* without favors being given to *any* could possibly be devised, and while the expense would not be large the advantages which would accrue would be great beyond measure.

It was not to be expected that the Commissioners could inaugurate this valuable adjunct to the viticultural industry without violent opposition from those who object to the popularization of producers' brands, but the successful operation of the exhibit and café has caused most of this opposition to die away. Time and experience have sanctioned the wisdom of the step.

At present, the café is leased to capable restaurateurs, who supply only the wines and brandies from our exhibits to their patrons. The money received from the sale of these wines is returned to the exhibitors. The exhibit and café are visited by producers, merchants, the general public, and visitors and buyers from the East and abroad. In showing what the producers and merchants of the State have, it has proved itself invaluable.

As an educational medium for wine makers and merchants, the exhibit has done excellent service. It has created among all classes a desire to attain certain types, which are better understood than ever before. For instance, in the case of Sauternes, it has instructed the most progressive men what a Sauterne should be, and has stimulated a worthy desire to reach a high type. This is equally true in the case of other wines. A most marked and gratifying improvement has been made, too, in the bottling, labeling, and packing of wines since the display was opened. The first wines that were shown were, as a rule, badly bottled—bottled indiscriminately, would perhaps be a better term. Clarets were sent in Rhine wine bottles; sweet wine, in Rhine wine bottles; white wine, in claret bottles; Burgundy, in claret bottles, and every possible combination of errors in this respect could be noted. The labels were not as neat and tasty as those that are on the bottles now sent for exhibition. In a word, the principal merchants and producers have learned more about the proper manner of bottling and labeling wines in the past two years than in the whole period preceding in which wines were produced in the State.

An objection has been raised by unthinking or prejudiced persons against the privilege of sampling wines in the café. It must be remembered that if the exhibit is to have its greatest value as a means of disposing of wines, there must be facilities where they can be tasted. In connection with a restaurant this can be done without the least objectionable features being introduced. There is no indiscriminate bottle-opening on the premises; no wine is sold by the glass; and none can be *obtained except in the original unbroken packages*. This is a rule which is insisted on by every officer of the Commission, and is never broken. The unthinking, the prejudiced, and the ignorant who have joined collectively in an attack on our exhibit as the "State Saloon," therefore have nothing on which to base their assertions.

The operations of the café, and the disposition of the wines sent by exhibitors to the rooms of the Commissioners since the opening of the permanent exhibit, are shown by the following statement prepared by Mr. Wm. H. McNeil, the storekeeper:

RECEIPTS OF BOTTLES.

From all exhibitors from January 15, 1889, to June 30, 1890.....	15,596
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DISPOSITION.

On exhibit.....	744
Used as sample.....	238
Used by exhibitor.....	414
Sent to Paris.....	56
Broken.....	44
Returned.....	853
Sold.....	8,255
On hand June 30, 1890.....	4,992
	15,596

The statement of sales from January 15, 1889, to June 30, 1890, is as follows:

Bottles sold.....	8,255
Bottles other disposition.....	2,349
Bottles on hand.....	4,992
Total.....	15,596
Amount received from sales, \$4,081 15.	

The money received from the sale of the wines was disposed of as follows:

Corkage and café.....	\$1,145 25
Reserve Fund.....	377 30
Amount paid exhibitors.....	2,558 60
	\$4,081 15

The variety of wines on exhibit in the hall of the Commissioners is limited only by the variety of wines produced in the State. The appended statement will show how varied and complete the exhibit is in every sense of the word.

WINES ON EXHIBIT.

SPARKLING.

Champagne.....	
----------------	--

WHITE WINES (DRY).

Burger	2
Chablis	1
Chateau Yquem	1
Chasselas (Golden)	5
Gutedel	16
Hock	8
Haut Sauterne	3
Riesling	27
Sauterne	18
Semillon	2
Sauvignon Vert	4
Traminer	2
White wine	1

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RED WINES (DRY).

Beclan	1
Burgundy	23
Cabernet	10
Carignan	1
Chauche Noir	1
Chambertin	2
Claret	18
Grenache	1
Gros Mancin	1
Malbec	1
Margaux	1
Mataro	2
Pineau	2
Petit Syrah	1
Zinfandel	24

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SWEET WINES.

Angelica	11
Frontignan	1
Madeira	3
Malaga	5
Muscatel	15
Port	28
Tokay	2

65

SHERRY.

Sherry	19
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BRANDY.

Brandy	33
--------	----

RECAPITULATION.

Sparkling	2
White (dry)	90
Red (dry)	89
Sweet	65
Sherry	19
Brandy	33

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VITICULTURAL CONVENTION.

The Seventh Annual Viticultural Convention was held under the direction of the Commissioners and in our hall, on August 13-17, 1889. In spite of the discouraged feeling then prevailing among the grape growers and wine makers, the Convention was well attended and the meetings were marked by spirited discussions.

The Convention was opened with an address by Charles A. Wetmore,

then President of the Commissioners. Following his remarks, the committees to sample the wines sent for examination were announced. These committees were composed of the following gentlemen:

White Wine Committee.—George Husmann, of Napa County; Julius P. Smith, of Livermore; William Rueff, of San Francisco; H. A. Merriam, of Los Gatos; Capt. J. Chamon de St. Hubert, of Fresno.

Red Wine Committee.—A. G. Chauche, of Livermore; Dr. John A. Stewart, of Santa Cruz; N. E. Rose, of St. Helena; Richard Heath, of Napa County; E. Dichman, of New York.

Sweet Wines and Brandies.—S. McCullach, of New York; George Johnston, of San Francisco; R. J. Harrison, of San Francisco.

These committees at once set about the examination of the wines submitted to them. It had been specially provided in the call for the Convention that old wines, as far as possible, be sent for this purpose and the vineyardists readily complied with this request. In all, two hundred and six samples of dry and sweet (fortified) wines and brandies were tasted and classified.

The opening session on the thirteenth was devoted to a discussion of the subject, "The Conditions now Prevailing in the Markets for Viticultural Products and the Causes of Depression in the Prices of Wine." I. DeTurk, of Santa Rosa, led the discussion, contending that distillation should be resorted to to dispose of the poor wines. The good wines would take care of themselves.

At the evening session Professor E. W. Hilgard, of the University of California, delivered an address in favor of the electric process of aging wine and advocating the pasteurization of all wines before shipping. This address provoked a long discussion between Professor Hilgard and President Wetmore, ending with an address by E. Dichman attacking both processes.

On the fourteenth, "The Present Prosperity of the Raisin and Table Grape Industries and Possible Dangers in the Future" was announced as the subject for discussion. B. N. Rowley read a paper showing how California raisins had crowded the Malaga raisins from the American markets. The evening session was devoted to a consideration of the proposition to dry wine grapes, W. P. Bartlett leading the discussion.

The subject discussed at the first session on the fifteenth was "Remedies for Present Difficulties, including Drying of Wine Grapes, Distilling, Coöperative Organizations, Popular Agencies in Eastern States and Foreign Countries, Improvement in Quality of Products, and Notable Defects that may be Overcome." The session was marked at times by sharp discussions. A paper on "Fermentation," bearing on the subject of the day, was read by R. E. Wood. In the evening, Arpad Haraszthy addressed the Convention on "Brandy Distillation." Prefacing his remarks with a review of the labors of the committee appointed by the Grape Growers and Wine Makers' Association, to organize a joint stock company to distill brandy, of which Mr. Haraszthy was Chairman, he referred to the fact that \$100,000 had been subscribed by capitalists, but he had found that capital generally was not inclined to take hold of the enterprise unless the producers showed faith in the scheme by supporting it. The local wine merchants, he said, were in favor of the plan, but the wine growers must be up and doing if they wanted it to succeed. One drawback to securing capital was the fact that the Brandy Union could not at present be assured a sufficient amount of grapes

and wine to carry on business on a large scale. In order to overcome this difficulty, Mr. Haraszthy suggested that growers might insure the Union the delivery of a quantity of grapes sufficient to meet the demand in the various districts in which distilleries might be operated. He also suggested another plan to meet the approaching emergency, by proposing that growers contract to furnish one hundred thousand tons of grapes, to be distilled on small margins with the limited capital available. Another plan had been proposed, and that was to divide the vine-growing sections into districts, organize a local company with a practical man as President, erect a distillery, and have the surplus grapes of these districts made into brandy. If this were done, Mr. Haraszthy was confident that the Brandy Union could be formed and operated for a bottom figure. He further stated that the eastern market was fully supplied with wine, the cellars throughout the State were comparatively full of wine, and it was plain to be seen that it was useless to attempt to put this wine with that of the coming vintage upon an overstocked market. On the other hand, there was a wide market for brandy in this country, and in Europe as well, where there was a large demand for grape spirits for use in the manufacture of cologne.

The first business before the Convention on the sixteenth was the reception of the reports of the Committees on Wine Exhibits.

The Committee on Red Wines submitted the following:

Your committee would report that they found the wines submitted to them almost unexceptionally of good character—indeed, some wines deserve the highest praise.

We would add that the number of Medoc types was almost a surprise to your committee for the number and quality, causing them to note that we have already entered into a new era of wine production—the era of wines of the best Medoc types.

Among the large number of exhibits it was a subject of remark that there were only one or two specimens that did not come up to the standard.

The judgment of the committee on the samples submitted to them is as follows:

Zinfandel, 1888.—No. 1, J. P. Smith, Livermore. No. 2, George A. Bram, Santa Cruz.

Zinfandel, 1887.—No. 1, Purity Wine Co., San Francisco. No. 2, Los Gatos and Saratoga Wine Co., Los Gatos.

Zinfandel, 1886.—No. 1, I. DeTurk, Santa Rosa. No. 2, A. G. Chauche, Livermore.

Zinfandel (old).—No. 1, I. DeTurk, Santa Rosa. No. 2, I. DeTurk, Santa Rosa.

Burgundy, 1888.—No. 1, C. A. Wetmore, Livermore.

Burgundy, 1886.—No. 1, I. DeTurk, Santa Rosa.

Burgundy (old).—No. 1, C. A. Wetmore, Livermore. No. 2, C. A. Wetmore, Livermore.

Petit Bouschet, 1888.—No. 1, C. C. McIver, Mission San José.

Medoc, 1888.—Extra, George West & Son, Stockton. No. 1, C. A. Wetmore, Livermore.

No. 1, C. C. McIver, Mission San José. No. 1, George West & Son, Stockton. No. 1, J. A. Stewart, Santa Cruz.

Medoc, 1887.—No. 1, Los Gatos and Saratoga Wine Co., Los Gatos. No. 2, C. C. McIver, Mission San José.

Medoc, 1886.—Extra, John T. Doyle, Cupertino. No. 1, C. A. Wetmore, Livermore. No. 1, C. C. McIver, Mission San José. No. 2, C. A. Wetmore, Livermore.

Cabernet Franc, 1888.—No. 1, C. C. McIver, Mission San José.

Malbec, 1888.—No. 1, J. P. Smith, Livermore.

Mataro, 1888.—No. 1, T. L. Fowler, Livermore.

Petit Pinot, 1888.—No. 1, H. B. Wagoner, Livermore.

Mondeuse, 1888.—No. 1, C. C. McIver, Mission San José.

Beclan, 1888.—No. 1, C. C. McIver, Mission San José.

Petit Syrah, 1888.—No. 1, C. C. McIver, Mission San José. No. 2, Charles Krug, St. Helena.

Tannat, 1888.—No. 1, J. P. Smith, Livermore.

Mataro and Zinfandel, 1887.—No. 1, J. L. Beard, Warm Springs.

Mondeuse (blend), 1888.—No. 1, C. C. McIver, Mission San José.

Respectfully submitted.

J. A. STEWART.
A. Y. CHAUCHE.
P. KLEIN.
RICH. S. HEATH.
E. DICHMAN.

The report of the White Wine Committee was as follows:

The committee appointed by you which had the white wines under consideration beg leave to submit the following report:

As an introduction, allow us to state how we proceeded in this difficult but pleasant task.

The wines were brought to us singly, numbered, and with name or type they represent, or are intended to represent, and also with the date of vintage; but without any indication of the owner's or maker's name. They were divided into three classes; one the Riesling, Gutedel, and Hock; the second, the Sauterne; third, miscellaneous or new varieties.

Thus the Rieslings of one vintage were compared and tested by themselves, and the same with each other variety and vintage; each member of the committee making his own mark and voting for the sample found first, second, and third best, while the inferior or defective wines were left out altogether. We are thus in the dark, as yet, who produced the best, but let us say that in most cases the committee was nearly unanimous on the best numbers, while they found several or a few instances, several samples that they had to class as No. 1, being about equal in quality. And here let us say that it affords us much pleasure to state as our unanimous opinion that we were surprised and delighted with the quality of most of the samples, showing great progress in the making and handling of the wines, as compared with the samples of former years, and foreshadowing a bright future for our white wines. Such wines as it was our privilege to taste are bound to make a market anywhere sooner or later, and to bring good prices.

The committee's classifications were as follows:

- Riesling, 1888.*—No. 1, C. C. McIver, Mission San José.
Riesling, 1887.—No. 1, C. C. McIver, Mission San José. No. 2, Charles Krug, St. Helena.
Riesling, 1886.—No. 1, H. W. Crabb, Oakville.
Riesling (old).—No. 1, I. DeTurk, Santa Rosa. No. 2, M. M. Estee, Napa.
Orleans Riesling, 1888.—No. 1, C. C. McIver, Mission San José.
Orleans Riesling, 1887.—No. 1, J. P. Smith, Livermore. No. 2, C. C. McIver, Mission San José.
Orleans Riesling, 1886.—No. 1, J. P. Smith, Livermore.
Hock, 1886.—No. 1, H. W. Crabb, Oakville.
Gutedel (old).—No. 1, H. W. Crabb, Oakville. No. 2, M. M. Estee, Napa.
Sauvignon, 1888.—No. 1, H. W. Crabb, Oakville.
Sauterne, 1888.—No. 1, H. W. Crabb, Oakville. No. 2, C. C. McIver, Mission San José.
Sauterne, 1887.—No. 2, Los Gatos and Saratoga Wine Company. No. 3, C. C. McIver, Mission San José.
Sauterne, 1886.—No. 1, C. A. Wetmore, Livermore. No. 1, A. G. Chauche, Livermore. No. 1, J. P. Smith, Livermore. No. 2, H. W. Crabb, Oakville.
Sauvignon Blanc, 1888.—No. 1, J. P. Smith, Livermore.
Muscadelle du Bordelais, 1888.—No. 1, J. P. Smith, Livermore. No. 2, Geo. Husmann, Napa.
Louisiana, 1888.—No. 1, Geo. Husmann, Napa.
Semillon, 1888.—No. 1, George A. Bram, Santa Cruz.
Semillon, 1887.—No. 1, George A. Bram, Santa Cruz.
White Burgundy, 1888.—No. 1, C. A. Wetmore, Livermore.
Chauche Gris, 1888.—No. 2, George A. Bram, Santa Cruz.
Chauche Gris, 1886.—No. 1, George A. Bram, Santa Cruz.
Burget, 1888.—No. 1, C. C. McIver, Mission San José; No. 2, H. B. Wagoner, Livermore.
Golden Chasselas, 1887.—No. 2, J. L. Beard, Warm Springs.
Golden Chasselas, 1888.—No. 1, Charles Krug, St. Helena.
Sauvignon Blanc, 1888.—No. 1, J. P. Smith, Livermore.
White Wine, 1887.—No. 2, Purity Wine Company.

(Signed):

CAPT. J. CH. DE ST. HUBERT.
 N. E. ROSE.
 WILLIAM RUEFF.
 GEORGE HUSMANN.
 J. P. SMITH.

The report of the Committee on Sweet Wines and Brandies was as follows:

- Port, 1888.* No. 1, George West & Son, Stockton. No. 2, Mrs. De Wiederhold, Healdsburg.
Port, 1887.—No. 1, George West & Son, Stockton. No. 2, H. W. Crabb, Oakville.
Port (old).—No. 1, George West & Son, Stockton.
Sherry, 1888-1887.—No good samples found.
Sherry, 1886.—No. 1, George West & Son, Stockton.
Sherry (old).—No. 1, George West & Son, Stockton. No. 2, I. DeTurk, Santa Rosa.
Frontignan, 1888-1887.—No. 1, George West & Son, Stockton.
Muscatel, 1887.—No. 1, F. L. Fowler, Livermore.
Muscatel, 1886.—No. 1, Charles Krug, St. Helena.

Brandy, 1888.—No. 1, J. P. Smith, Livermore. No. 2, George West & Son, Stockton.
Brandy, 1887.—No. 1, George West & Son, Stockton. No. 2, Charles Krug, St. Helena.
Brandy, 1886.—No. 1, George West & Son, Stockton. No. 2, I. DeTurk, Santa Rosa.
Brandy (old).—No. 1, George West & Son, Stockton.

A collection of samples submitted by E. J. Baldwin, not for competition, consisting of Angelica, Muscatel, Madeira, Port, and Brandy, was highly commended.

Following the committee reports, John T. Doyle read a paper on "Legislation" as pertaining to the wine industry. He recommended that a law be passed permitting wine growers to use a pure wine stamp for their wines. By this means, the purchaser would be sure of receiving wholesome wine, and there would be no sale for impure or adulterated products. Congressman W. W. Morrow, ex-Congressman C. N. Felton, and others spoke of the probabilities of securing legislation in the direction stated by Mr. Doyle, and in the way of securing free brandy for fortification of sweet wines. In the evening, the Anaheim vine disease was considered, and Professor Ethelbert Dowlen, who has had charge of the investigation of the malady, delivered an address in which he recounted the progress and work of the disease, the experiments that have been made to discover its cause and find a remedy, etc., all of which have heretofore been published. Mr. Dowlen also exhibited specimens of the diseased vines with and without the microscope.

The seventeenth was devoted to discussion on the subject of "Possible Coöperation between Producers to Maintain Production on a Profitable Basis." T. V. Munson, of Denison, Texas, addressed the Convention on the native American wines, which he has studied for ten years. The Convention then adjourned *sine die*.

PRODUCTION OF WINE.

The production of wine has not increased to any extent since the final report made in 1887 by Arpad Haraszthy, formerly President of the Commission, nor is there any reason to anticipate any great increase within the next three or four years. During the years 1885, 1886, and 1887, the annual yield was increased to a great extent by reason of the vineyards planted after the revival of the wine industry consequent on the formation of this Commission, and the steadily increasing demand from the East. The yield of 1886, 1887, and 1888 was above the normal demand for those years, but the demand now equals the supply. The vintage for the past three years, beginning with where Mr. Haraszthy left off in his report, has been as follows:

1887.....	15,000,000 gallons.
1888.....	17,000,000 gallons.
1889.....	15,000,000 gallons.
1890 (estimated).....	15,000,000 gallons.

Appended will be found a statement of the price of wine grapes paid during the vintage of 1889. These prices are perhaps as low as will ever be paid, the reaction in the wine market this year precluding such low prices during the season of 1890. Of course, the prices varied in different localities, but the following may be taken as representing average prices when local causes had no disturbing effect:

Cabernet.....	\$25 00 to \$40 00 per ton.
Petit Pinot.....	15 00 to 25 00 per ton.
Meunier.....	15 00 to 23 00 per ton.
Riesling.....	12 00 to 15 00 per ton.
Mataro.....	8 00 to 12 00 per ton.
Zinfandel.....	8 00 to 12 00 per ton.
Charbono.....	8 00 to 10 00 per ton.
Malvoisie.....	8 00 to 10 00 per ton.
Mission.....	8 00 to 10 00 per ton.

PRODUCTION OF BRANDY.

Within the past two years the production of brandy has assumed a relative importance in viticulture never before attained in the history of the development of the industry in California. Circumstances made the opportunity for distillers to compete with the foreign product exceedingly auspicious. Not only were the vineyards in the Charentes in France weakened by the attacks of phylloxera, rendering the French distillers almost unable to supply their own home market, but the price of grapes fell so low in California that the distillers were able to seize the opening which was presented. At present we are not only supplying the home market, but the East, and Germany and England are drawing heavily on our supplies. The distillation of brandy appears to have no limit except the inability of the distillers to obtain material upon which to work at sufficiently low prices to enable them to operate at a profit. Aside from the ordinary grades of brandy which are produced, the distillers are reaching for the better grades. The success of the State Viticultural Commissioners in securing a gold medal at Paris in 1889 for brandies, shows conclusively that the finer grades are within the reach of the careful and painstaking distiller. We have already produced brandies which challenge the admiration of the most noted experts who have examined them.

The records of the Internal Revenue Department afford the best statement of the total production of brandy. Prior to 1864, the department did not keep its records of brandy separate from the records of the production of whisky and other spirits. Even up to the present time no separate classification of the fruit brandies is attempted, and so the records for California include the distillates of peach and other fruit brandies as well as of grape brandy. These are so small, however, as not to materially affect the value of the following statistics of production, which were furnished through the kindness of Hon. John W. Mason, United States Commissioner of Internal Revenue:

FISCAL YEAR ENDING JUNE 30.	Proof Gallons.
1865	20,415
1866	74,773
1867	47,303
1868	152,418
1869	286,753
1870	169,791
1871	157,107
1872	211,916
1873	118,605
1874	99,680
1875	297,147
1876	142,799
1877	157,159
1878	318,071
1879	158,393
1880	238,928
1881	351,206
1882	502,513
1883	324,717
1884	295,039
1885	383,756
1886	402,121
1887	742,445
1888	953,580
1889	915,573
1890	1,072,957

It will be noticed from the above figures that there have been periodical increases and decreases of the production in this time of twenty-five years covered by the statistics. There is only one exception to this rule, and that is in the case of the past four years. Though the distilling interest increased enormously in these years, the demand was fully up to the supply, and the distillation of 1889-90 was undoubtedly the heaviest ever known.

Anticipating a trifle on the report of 1891, which is yet to come, I will state that up to the first of September of the present year one hundred and forty-nine distilleries had registered at the offices of the Internal Revenue Collectors for the distillation of fruit brandy during the season of 1890. These distilleries are found in twenty-eight counties, showing how widely spread the production has become. The distillers who registered up to that time, as furnished by Revenue Collectors W. H. Sears of the First District, and H. W. Byington of the Fourth District, are as follows:

FIRST DISTRICT.

No.	NAME OF DISTILLER.	Post Office.
3	F. Joost	Martinez.
4	Pironi & Slati	Los Angeles.
5	Eugene Paris	Livermore.
11	L. J. Rose Co. (limited)	Los Angeles.
21	C. O. Rust	Anaheim.
29	Cucamonga Vineyard Co.	Cucamonga.
46	Secondo Guasti	Los Angeles.
51	Fernando Bessolo	Camulas.
71	Wm. Palmtag	Hollister.
101	Henry Lefranc	San José.
120	George West	Stockton.
141	Demarteni & Cereghino	Clayton.
158	Charles Stern	Los Angeles.
164	John Jasprizza	San José.
168	Baldwin Distilling Co.	Santa Anita.
172	Joseph Merithew	Cupertino.
175	Eisen Vineyard Co.	Fresno.
177	Charles Francois	Gilroy.
180	James Hennessy	San Francisco.
211	Timm J. F. Boege	Anaheim.
214	Nicholas Baravich	San José.
217	Herman C. Eggers	Fresno.
218	San Gabriel Wine Co.	San Gabriel.
220	Reinert & Weis	San Bernardino.
225	Fresno Vineyard Co.	Fresno.
226	Barton Estate Co. (limited)	Fresno.
228	Alexander Henry	Anaheim.
230	Hermann Boettcher	Los Angeles.
233	Gotlob Bayha	Yorba.
234	George Yung	Orange.
236	Pomona Wine Co.	Pomona.
237	Emile Vache	Brookside.
240	N. Anticovich	San José.
243	Joseph Young	Orange.
246	Gottardo Bustelli	Livermore.
248	Bernard Distel	Fremont.
250	Downey Vintage Co.	Downey.
251	Jacob Rudel	San Gabriel.
252	George Betz	Ramona.
254	Louis Schorn	Anaheim.
257	Sierra Madre Vintage Co.	Lamanda Park.
260	A. Poulain	San José.
261	Henry Wehmeyer	Anaheim.
263	C. K. Kirby	Fowler.
264	Hermann Granz	Fresno.
266	Paul O. Burns Wine Co.	San José.
267	Emerson W. Scott	Santa Clara.
277	A. Delpech	Patchin.
279	O. G. Anderson	Fresno.
282	Webster & Sargent	Minturn.
284	J. B. J. Portal	San José.
287	Los Gatos and Saratoga Wine Co.	Los Gatos.
288	Florence Winery	Florence.
289	Los Gatos Coöperative Winery	Los Gatos.
290	Paul Wack	Los Angeles.
291	Roscoe Winery	Los Angeles.
293	Pacific Wine Co.	San José.
297	Henry Mel	Glenwood.
299	Sierra Vista Vineyard Co.	Minturn.
303	Pacific Wine Co.	San José.
306	Henry B. Wagoner	Livermore.
307	Charles Deto	Mountain View.
308	A. Zicovich	San José.
313	Santa Cruz Mountains Wine Co.	Santa Cruz.
314	Glen Terry Wine Co.	Clayton.
315	Buhach Produce and Manufacturing Co.	Atwater.
318	Theodore Beck	Santa Cruz.

FOURTH DISTRICT.

No.	NAME OF DISTILLER.	Post Office.
7	A. Douet	Amador County.
9	F. Borreo	Napa.
11	S. C. Hastings	Lakeport.
13	James Sweeney	Placerville.
14	J. Kinner	Green Valley.
20	G. D. Endriss	Coloma.
21	George Hood	Santa Rosa.
22	J. D. Winters	Sonoma County.
24	P. & J. J. Gobbi	Healdsburg.
25	C. J. Dunn	Sonoma County.
26	George Lang	Calistoga.
33	E. C. Priber	Napa.
40	L. Rasmussen	Coloma.
42	Martin Feusier & Co.	Santa Rosa.
43	Henry Mette	Mormon Island.
45	B. Dreyfus & Co.	Sonoma County.
49	Kohler & Van Bergen	Guthrie's Station, Sac'to Co.
53	J. Laurent	St. Helena.
57	M. M. Estee	Napa.
58	E. M. Grimes	Napa County.
73	J. Dowdell	St. Helena.
78	J. Zentgraf	Shingle Springs.
82	Kortum & Fulcher	Napa County.
84	G. Sieber	Marysville.
85	G. M. Wubbina	Mormon Island.
87	C. P. Adamson	Rutherford.
90	Leland Stanford	Vina.
98	H. Hugot	El Dorado County.
103	California Distillery Co.	St. Helena.
104	J. M. Ramm	Camptonville.
108	Italian-Swiss Agricultural Society	Cloverdale.
113	A. Lancel	Occidental.
122	E. G. Furber	Cloverdale.
129	Kohler & Frohling	Glen Ellen.
131	J. F. Miller	Shasta County.
133	William Hill	Sonoma County.
137	M. J. Azeveda & Co.	Sacramento County.
142	A. B. Dresbach	Grass Valley.
143	A. Isoard	Nevada City.
152	C. Hellwig	Grass Valley.
158	M. S. Nevis	Sacramento.
159	J. Kaiser	Penryn.
161	E. A. Hood	Santa Rosa.
167	G. Engler	Sonoma.
168	Wm. Goldstein	Napa County.
169	Charles Krug	St. Helena.
171	L. Ponlin	Sonoma County.
186	A. Domeniconi	Sonoma.
187	Stamer Bros.	St. Helena.
192	E. W. Davis	Santa Rosa.
193	G. Groezinger	Yountville.
195	Walden & Co.	Geyserville.
196	C. Aguillon	Sonoma.
200	J. Oberti	Cordelia.
202	John Thoman	St. Helena.
207	C. Carpy	Napa.
208	J. Chauvet	Glen Ellen.
215	James Finlayson	Sonoma County.
216	Joseph Simi	Sonoma County.
219	R. F. Tilveria	Butte County.
221	G. F. Hooper	Sonoma.
222	Natoma Vineyard Co.	Natoma.
223	I. DeTurk	Santa Rosa.
224	La Roza & Nevis	Sacramento.
225	J. A. Prien	Napa County.
232	Orleans Distilling Co.	Orleans.
234	Beringer Bros.	St. Helena.
235	H. E. Weinberger	St. Helena.
237	J. Lonnibos	Sonoma.
240	C. Gundlach	Sonoma.

FOURTH DISTRICT—Continued.

No.	NAME OF DISTILLER.	Post Office.
243	Bouchou & Batemale	Cordelia.
245	H. Bolle	Sonoma County.
247	G. F. Fisher	Sonoma.
249	J. H. Wheeler	St. Helena.
251	Lay, Clark & Co.	Santa Rosa.
255	F. Sciaroni	St. Helena.
258	A. Korbel	Sonoma County.
261	P. Bieber	St. Helena.
263	John Benson	Oakville.

PRODUCTION OF RAISINS.

The planting of raisin grape varieties is going on at a rapid rate, and the time has come for the raisin producers and those contemplating becoming such to inquire whether this unusual haste to secure vineyards of this description will lead. A very careful study of the whole subject is being made by George West, the Commissioner for the San Joaquin District, with a view of ascertaining what the probable product will be when the many thousands of acres of new vines in the counties of Fresno, Kern, and Tulare are in bearing. His studies are directed towards averting, if possible, any over-planting, so that the raisin producers will not have the same difficulties to overcome as were encountered by the wine makers in 1887, 1888, and 1889. I desire at this point to call the attention of the raisin makers and the producers of grapes suited only to raisins, that up to the present there has been but little increase in the total consumption of raisins in this country—certainly none over what might be expected with the normal increase of population—and that practically every box of raisins from California has merely crowded out a box from abroad. In other words, there has been but little increase per capita in the United States in the consumption of raisins. Unless the prices of raisins become lower than at present, there is little prospect of there being any such increase. From the best sources of information obtainable, the following statement of the production of raisins in the State since 1873 is given:

1873.....	6,000 twenty-pound boxes.
1874.....	9,000 twenty-pound boxes.
1875.....	11,000 twenty-pound boxes.
1876.....	19,000 twenty-pound boxes.
1877.....	32,000 twenty-pound boxes.
1878.....	48,000 twenty-pound boxes.
1879.....	65,000 twenty-pound boxes.
1880.....	75,000 twenty-pound boxes.
1881.....	90,000 twenty-pound boxes.
1882.....	115,000 twenty-pound boxes.
1883.....	140,000 twenty-pound boxes.
1884.....	175,000 twenty-pound boxes.
1885.....	470,000 twenty-pound boxes.
1886.....	703,000 twenty-pound boxes.
1887.....	800,000 twenty-pound boxes.
1888.....	950,000 twenty-pound boxes.
1889.....	1,250,000 twenty-pound boxes.
1890 (estimated).....	1,400,000 twenty-pound boxes.

From the statistics of the United States Bureau of Statistics of the Treasury Department have been collected the following figures showing the total imports of raisins into the United States, in pounds. These,

for purposes of comparison, have been reduced to twenty-pound boxes, though the bulk of foreign raisins come in twenty-two-pound (ten-kilogram) boxes. No figures can be obtained prior to 1884, at which time the Bureau separated raisins from the classification of "dried fruits." The imports for the fiscal years ending June 30th were:

YEAR.	Pounds.	In 20-lb. Boxes.
1884-----	53,702,220	2,685,111
1885-----	38,319,787	1,915,989
1886-----	40,387,946	2,019,397
1887-----	40,673,288	2,033,614
1888-----	40,476,763	2,023,838
1889-----	35,091,139	1,754,557
1890-----	36,914,330	1,845,716

Adding the California product in twenty-pound boxes, and the imports from abroad in the same unit, the result is the total American consumption. It results as follows:

YEAR.	Imported in 20-lb. Boxes.	California— 20-lb. Boxes.	Total American Consumption— 20-lb. Boxes.
1884-----	2,685,111	175,000	2,860,111
1885-----	1,915,989	470,000	2,385,989
1886-----	2,019,397	703,000	2,722,397
1887-----	2,033,614	800,000	2,833,614
1888-----	2,023,838	950,000	2,973,838
1889-----	1,754,557	1,250,000	3,004,557
1890-----	1,845,716	1,400,000	3,245,716

With these statistics in hand, the work of Commissioner West becomes doubly important. The investigation which he is making will place this Commission and the public in the possession of reliable statistics of the extent of planting in the three counties named, and supplemental to this will be the work of Commissioner Stephens in the northern raisin-producing districts, and Commissioners Rose and Shorb in the producing districts in the southern portion of the State.

DRYING WINE GRAPES.

During the vintage of 1888 a considerable quantity of wine grapes were sun-dried in various portions of the State, in the hope that a market could be found for them in the French establishments, which were making wine from dried grapes from Turkey and the Levant; and to a less degree in the eastern markets for dried fruit. These experimental lots were slow of sale at first, particularly in the East, but they were sold at prices that amply repaid the driers for their time and pains, considering the then low price of wine grapes.

Throughout the winter of 1888-9 the feasibility of opening new markets abroad was thoroughly discussed by the vitiiculturists, and in the spring of 1889 the Commissioners delegated Mr. J. B. J. Portal, of San José, then on his way to Europe on a business and pleasure trip, to investigate the French markets for dried grapes. Mr. Portal's several reports will be found in detail in another part of this report. While

not at all encouraging, the Commissioners, in having the investigation made, contributed largely to the knowledge of the importance to which the manufacture of such wines has attained. Early this season the Commissioners received a communication from a London commission merchant, offering \$50 a ton for all the dried grapes laid down in French or North German ports. This offer was never accepted by the grape driers, who found that they could do better in their home markets.

The season of 1889 saw grape drying carried on on a far larger scale than in 1888; and early in 1890, when it was learned that there was a heavy shortage in the eastern fruit crops, the inquiry for these dried grapes rose to proportions never anticipated in the beginning. The demand has become so great as to seriously reduce the wine yield, but it is my own opinion that the culmination has been reached for the present. Grapes for wine making from the present outlook, will command a sufficiently high price at the wineries in 1891 to deter any extensive contracts for drying, such as were signed in the season of 1890.

THE ADVANCE OF THE PHYLLOXERA.

In the counties of Napa, Sonoma, and Solano, the phylloxera has continued its progress, and in many of the sections devoted to vine culture no efforts, beyond a few half-hearted and spasmodic attempts, have been made to check its ravages. Alameda County has a new center of infection, aside from the one at the University at Berkeley, at Mission San José, where, however, strenuous exertions are being put forth to prevent any rapid extension.

The full extent of the ravages during the past two years in the counties of Napa and Sonoma can scarcely be appreciated by those not familiar with the situation. Thousands of acres have been affected, and the loss of the vines will be the more severely felt now that the demand for our wines has caught up with the supply. Those vineyardists who neglected their vines on account of the temporary depression in the wine market, will have cause to regret their shortsightedness, now that the rise in wine has come.

I cannot too strongly urge upon vineyardists the absolute necessity of meeting the emergency the moment that the insects are discovered. All affected vines should be promptly pulled up and burned on the spot and resistant stocks of approved varieties substituted after the spot, where the vine has been, is left uncultivated for a year or two. If this plan is conscientiously adhered to, there is no reason why the reconstitution of attacked vineyards should not be carried on while the death of the old vines is in progress. This would make the change vastly easier on the vineyardists than to wait until all the vines are dead before replanting.

Years of experience have proved with us, as with the vineyardists of France and other countries, that the substitution of resistant stocks for the old vines is the only radical remedy. It appears impossible to secure unanimous and effective action in the application of bisulphide of carbon, or sulphocarbonate of potassium, without which action all attempts to check the disease must prove abortive. Submersion, with us, is generally impracticable or too costly in the sections where the phylloxera now exists. Were the pest to reach Fresno, for instance, or any other county where irrigation is practiced, this remedy would, with-

out doubt, be largely resorted to. In connection with this discussion about phylloxera, I would call attention to the recommendation of E. C. Priber, Esq., the Commissioner for the Napa District, to the effect that the Commissioners undertake to supply resistant stocks to all vine growers who desire them.

SWEET WINE BILL.

The passage of the long desired "Sweet Wine Bill," by which the producers of sweet wines are permitted the use of brandy for fortification free of internal revenue tax, is a subject for congratulation; and it is meet at this time that due recognition be given to Hon. Joseph McKenna, Congressman from the Third District, and others, for their long and persistent efforts to secure this boon for the sweet wine producers, and all wine makers generally. The clause permitting the use of grape spirits for fortifying dry wines for export must necessarily foster shipments of wines abroad, particularly to Europe, and there will soon arise a demand for neutral grape spirit to meet all wants in this respect.

The Commissioners have had a leading part in securing this desired legislation. The original "Sweet Wine Bill" was drawn by Hon. Charles A. Wetmore years ago, and on his first draft all other measures of the same sort have been based. The greatest victory was in obtaining the exclusive use of grape spirits for fortifying. This Commission has stood at times almost alone among all organized bodies, in resisting all overtures permitting the use of corn spirit, wheat spirit, or any other spirit not produced from the grape. This is one of the most important features of the bill, and by maintaining this position from the first to last in the five years' struggle to secure the passage of the bill, a substantial advantage has been gained for the wine makers, and for the industry generally.

WORLD'S FAIR.

It is proper at this time to call attention to the necessity of action this winter in taking the preliminary steps toward having the viticultural products of California represented at the World's Fair, in Chicago, by a suitable display. A petition should be sent to the Legislature from the Commission and other organized viticultural bodies, urging coöperation in all measures looking towards a satisfactory and creditable exhibit. This is a matter which should receive earnest attention from all classes concerned in viticulture, and the earlier that active work is begun the better it will be for us. It must be recognized that a suitable display cannot be picked up haphazard in the course of a few months.

DEMAND FOR PUBLICATIONS.

The demand for the publications issued by the Commission from time to time since 1880 is constant. Many of these publications are out of print and still the inquiry for them never relaxes. The Commission is in almost daily receipt of letters from California, and also from the East, Australia, France, Germany, Mexico, and other places, for complete sets of our reports and other printed matter. In view of this, I would recommend that many of these valuable documents, now unobtainable, be again put into print, that the work of the Commission shall be as thorough as possible.

STATISTICAL.

In his annual report to the Governor, filed April 12, 1888, Mr. Arpad Haraszthy, then President of the Commission, presented a very complete and exhaustive statement of the exports of California wines and brandies to various foreign countries by sea, to New York by water, and to the East by rail. These statistics have been carefully kept up since Mr. Haraszthy's complete statement was prepared, and the statistics corrected up to the first of January, 1890, will be found appended:

Receipts of wine and brandy from the interior were as follows:

YEAR.	Wine—Gallons.	Brandy—Gallons.
1887-----	8,496,344	256,104
1888-----	8,852,611	227,585
1889-----	10,523,504	517,243

The extent of the increase is shown by the fact that in 1875 the wine receipts were but 1,995,629 gallons, and the brandy receipts but 52,036 gallons.

The total wine shipments by sea and rail were as follows:

YEAR.	By Sea—Gallons.	By Rail—Gallons.	Total—Gallons.	Total Value.	Average Price.
1887-----	1,958,032	4,943,739	6,901,771	\$3,140,305	\$0 45.2
1888-----	*3,344,550	3,875,232	7,235,994	3,022,392	41.7
1889-----	†3,945,235	4,341,207	8,286,442	3,774,258	45.5

The total brandy exports, foreign and domestic, were as follows:

YEAR.	By Sea—Gallons.	By Rail—Gallons.	Total—Gallons.	Total Value.	Average Price.
1887-----	60,572	412,180	472,752	\$774,313	\$1 64
1888-----	85,120	365,960	451,080	690,152	1 53
1889-----	296,265	294,000	590,265	985,742	1 67

The exports of brandy are thus increasing at an enormously rapid rate, and were we to be permitted to bottle in bond, as was recommended by Mr. Haraszthy in his report, the exports would at once leap to such enormous quantities that the State's present production would be wholly inadequate to meet the demand that would at once spring up.

The detailed statement of the destination of the wines shipped by sea is as follows:

TO NEW YORK.

YEAR.	Gallons.	Cases.	Value.
1887-----	1,680,227	1,335	\$696,412
1888-----	3,052,755	1,244	1,266,200
1889-----	3,603,315	697	1,535,893

*And 6,485 cases, valued at \$25,940.

†And 5,659 cases, valued at \$24,971.

TO CENTRAL AMERICA.

YEAR.	Gallons.	Cases.	Value.
1887.....	31,260	2,534	\$34,654
1888.....	45,683	3,026	46,077
1889.....	44,769	2,781	43,639

TO MEXICO.

YEAR.	Gallons.	Cases.	Value.
1887.....	30,391	290	\$20,023
1888.....	51,084	641	31,403
1889.....	52,358	767	33,543

TO BRITISH COLUMBIA.

YEAR.	Gallons.	Cases.	Value.
1887.....	13,313	215	\$9,717
1888.....	12,782	342	9,563
1889.....	12,800	471	11,388

TO HAWAIIAN ISLANDS.

YEAR.	Gallons.	Cases.	Value.
1887.....	71,150	612	\$62,877
1888.....	66,667	492	56,434
1889.....	99,537	501	77,159

TO JAPAN.

YEAR.	Gallons.	Cases.	Value.
1887.....	28,378	526	\$16,401
1888.....	30,266	214	14,106
1889.....	22,710	117	10,571

TO EUROPE.

YEAR.	Gallons.	Cases.	Value.
1887.....	26,355	1,642	\$20,562
1888.....	62,662	248	36,112
1889.....	51,305	260	25,304

TO ALL OTHER COUNTRIES.

YEAR.	Gallons.	Cases.	Value.
1887.....	57,404	669	\$29,138
1888.....	22,660	278	12,404
1889.....	28,441	65	15,489

The total exports of brandy to foreign ports by sea were as follows:

YEAR.	Gallons.	Cases.	Value.
1887-----	26,899	639	\$36,154
1888-----	30,308	263	21,450
1889-----	82,102	-----	55,697

It is not out of place to give here the imports of foreign wines and brandies at San Francisco during the past three years. It will be noticed that there has been a decrease in the quantity of still wines imported in casks, showing that California wines in bulk are slowly driving out the imported article. The imports of still wines in bottles, and of brandy, show a slight increase. Champagne imports have increased heavily, not that the sales of the domestic article are suffering, but on account of the enormously increased competition and activity of the agents of the foreign producers. Appended are the figures:

STILL WINES IN CASKS.

YEAR.	Gallons.	Value.
1887-----	102,628	\$70,464
1888-----	106,127	75,320
1889-----	91,954	72,239

STILL WINES IN BOTTLES.

YEAR.	Dozen.	Value.
1887-----	15,083	\$58,201
1888-----	17,078	73,098
1889-----	23,848	84,587

CHAMPAGNE AND ALL SPARKLING WINES.

YEAR.	Dozen.	Value.
1887-----	10,617	\$135,492
1888-----	20,116	274,213
1889-----	19,747	270,911

BRANDY.

YEAR.	Proof Gallons.	Value.
1887-----	20,253	\$50,330
1888-----	29,494	66,067
1889-----	33,001	73,785

NEEDS OF THE COMMISSION.

At this time, when the tide has turned favorably for the wine makers, the Commission is in a position to do valuable service for those engaged in this branch of the viticultural industry. The Commission, as the recognized head of the classes who cultivate the vine, is looked to for information of all sorts, technical and other, for advice regarding legislation, whether State or national, and for information for the general public. It has the confidence of the vineyardist in every section and every valley, and its labors are appreciated by every class of producers.

To enable us to continue our work in behalf of the grape industry during the two fiscal years beginning July 1, 1891, the same appropriation as was passed by the last Legislature, viz.: \$35,000, will be required.

Respectfully,

I. DETURK,
President.

PROGRESS REPORTS

OF

JOHN H. WHEELER AND CHARLES A. WETMORE,

Chief Executive Officers.

REPORT OF JOHN H. WHEELER.

Read at the annual meeting, held June 9, 1889.

To the Board of State Viticultural Commissioners:

GENTLEMEN: In accordance with your instructions given me at the last regular meeting of the Board, I have made inquiry and investigations to determine the existence and extent of the vine disease, now commonly called the Los Angeles disease (now the Anaheim disease), in the northern vineyards of the State. At the time of this writing it seems safe to so denominate this evil, for its ravages, so far as I can learn, have been confined to Los Angeles County.

Soon after your last regular meeting, I sent circulars of inquiry to the vineyardists of the north, describing, in popular language, the manifestations which characterize the dying vines in Los Angeles County, warning vineyardists at the same time to carefully examine their vineyards and report to me any trouble similar to that described. Specimens from the diseased vines were asked for, to be sent me accompanying such reports.

In answer to these circulars, my attention was called to many other minor troubles encountered in the vineyards, but very few reported anything similar to the disease sought. Samples were sent from Sonoma, Napa, and Santa Clara Counties, which I forwarded to Professor Dowlen, the duly appointed specialist of the Board. He found on all the specimens a fungus identical with that existing on the diseased vines of the south.

My interpretation of Mr. Dowlen's reports, as a whole, leads me to understand that this fungus, which is common to all of the diseased vines of Los Angeles County, is the agent which performs the finishing work of destruction, though, perhaps, rendered more potent by antecedent causes not yet known or described.

The theory is amply proved:

First—In that the application of a fungicide arrests the decline of the affected vines, causing an apparent revival of the plant, which, however, falls again into a decline if left too long without a renewal of the application.

Second—In further support of this theory, I visited a number of our northern vineyards, from which samples were procured from apparently healthy vines—vineyards which at this time are in a magnificent state of vegetation and production. The samples, however, were taken from vines suffering from known causes or weakness, induced by causes other

than disease. For instance, the canes growing from a spur nearly severed from the vine by the cultivator formed one sample; a late growing sucker lying on the ground, and consequently frosted before maturity, made another; a rank eucalyptus invaded a small part of the territory of an otherwise healthy vineyard, thus weakening a few vines growing near. Samples were taken from these impoverished subjects, etc. On all of these specimens the fungus common to the diseased vineyards of the south was found, thus proving that the final agent of destruction exists in the north, awaiting only to succeed to other weakening causes to accomplish destruction similar to that produced in the south. The primeval cause may not, however, and it is to be hoped that it will not, ever come to the vineyards of the north.

In order to reconcile my work in the northern vineyards with that of your special committee, Commissioner J. DeBarth Shorb, of Los Angeles County, I have recently visited the vineyard districts of the southern counties, and examined the work of Professor Dowlen, who is making special investigations at San Gabriel. This gentleman I must, in passing, commend to the Board as an earnest, conscientious student, whose efforts are characterized thus far by a manifest determination to be accurate, and to sacrifice all hypotheses and theories to an absolute determination of facts by systematic analysis.

With Professor Dowlen I visited many vineyards in Los Angeles County, and inspected the other districts alone. A careful examination of the vineyards of San Diego County failed to reveal any cause for alarm in that section. The raisin vineyards of El Cajon possess unusual vigor and show no sign of suffering from any cause, except be it want of system in pruning.

The vineyards of San Bernardino County were also found in a very magnificent state of early vegetation, with no manifestations of disease. I carefully inspected every vineyard about Riverside, for the fungus mentioned before in this paper had been found at Riverside, but found no deathblow dealt by it in this section.

In Los Angeles County, however, a close inspection was not necessary to reveal the common prevalence of the malady throughout its whole extent. I found no vineyards exempt from the trouble, and an examination of the wild vines near San Gabriel confirmed the report of Professor Dowlen as to their perishing in like manner with the cultivated vines.

In my judgment, the first cause of the evil is yet to be found, and until then vineyardists must operate with the Bordeaux mixture or the powder proposed by Mr. Shorb, to prevent the fungus found from accomplishing its final work.

The report of one vineyardist examined is terse and significant. During the summer this proprietor had noticed the languishing of the terminal leaves and buds of his vines, in a manner that signalized the approach of the evil. The prompt application of the weak Bordeaux mixture of lime and copper immediately revived them. Two weeks after they were noticed to languish again. A repetition of the first treatment again completely resuscitated them. This and other similar experiences noted and reported by Commissioner Shorb are sufficient to bring about a common reliance on the proper fungicides for ameliorating the condition of the suffering vineyards.

I found that the reports of the extensive ravages of the evil in Los Angeles County had not been exaggerated. The Santa Ana Valley,

which once blossomed over with over five thousand acres of healthy and profitable vineyards, possesses less than five hundred acres to-day, and these in a suffering and apparently despondent condition. Commodious wineries, which once sounded with the busy hum of the joyful vintage, are now idle and silent. Professor Dowlen has already given to the public the order of resistance of many varieties of vines, one instance of which we observed together, and which I regard as worthy of special mention. The American varieties show a handsome growth and continue in good bearing in the midst of *viniferas* which have entirely perished.

If desirous of growing grapes of such quality, the proprietors may safely plant the Lenoir or Isabella in the affected region, securing healthy stocks, and favoring the vines with deep, heavy soil, choosing spots where summer irrigation is unnecessary.

The vineyardists of the afflicted region will be slow to replant their land to vines, though many are anxiously waiting and expecting to do so. For the benefit of these, I would suggest to Mr. Shorb and the Board the advisability of planting and maintaining an experimental vineyard in the midst of the diseased region, selecting for propagation those varieties which have proved most resistant, and are alike desirable, being careful to obtain all vines used for the purpose from districts totally exempt from damage by this cause. For whatever may be the original cause of the vines weakening, another century may now elapse without its recurrence, the probability of which is attested by the fact that the old vineyards have not before suffered from its attack.

Returning to my report proper, I can see no cause for general alarm in the north about this particular evil, for a diligent search has failed to reveal any vineyards, or even parts of vineyards, affected in the manner of those in Los Angeles County.

It was my desire and intention to visit the vineyards of Fresno and other central regions of the State, after becoming familiar with all phases of the disease in the south, but the limited time accorded me for completing this work proved insufficient.

In closing, I will state concerning the methods of producing tannin for the use of wine makers—which I was instructed to investigate—that I have written to proper authorities in France to secure their experience in the matter, the response to which letters will doubtless soon reach my successor for your use. For reports on other matters I must refer you to the appendices which have been issued from time to time, and to the correspondence had with vineyardists and newspapers, which of late has become more voluminous than I have known it before. The latter, if examined, will show a proper and commendable reliance on the Board in its labor of assisting vineyardists to overcome their many obstacles.

Very respectfully,

JOHN H. WHEELER,
Chief Executive Officer.

SAN FRANCISCO, April 30, 1889.

REPORT OF CHARLES A. WETMORE.

Read at the semi-annual meeting, held December 9, 1889.

To the Board of State Viticultural Commissioners:

GENTLEMEN: A regular meeting of this Board is now in progress. Questions relating to the proposed legislation affecting viticultural interests will necessarily come before you for consideration, and in anticipation thereof I respectfully submit a brief discussion of our past efforts and the nature of difficulties encountered, together with suggestions as to future demands and policy of action.

THE SWEET WINE BILL.

This measure commands immediate attention and most careful consideration of policy.

The object to be attained should always be clearly stated and kept distinct from all possible complications. Stated simply, the producers of pure sweet wines desire to be relieved from internal revenue taxes on the pure grape spirits necessarily used in fortification at the place of original production. The fortification of any wines, free of tax, for exportation to foreign countries, only at the time of departure is another question much simpler in dealing with.

Our producers have in the past considered the several side issues raised when presenting their demand for relief on sweet wines, and have repeatedly announced the policy which our delegation in Congress should pursue. The whole industry is in sympathy with the producers of sweet wines, yet it demands that no concession to other interests shall be made in order to procure the desired relief, if such concession will be injurious to the permanent prosperity and welfare of all concerned. The principles on which all can stand and work together must be positively adhered to, and advice should be so given in unmistakable words to our Representatives and Senators in Congress. The most important of these principles are the following:

1. Every effort must be made to resist any attempt to abolish the Internal Revenue system.

2. No reduction in the general tax on distilled spirits, intended for use as beverages, should be permitted, with the single exception of the possible partial reduction on fruit syrups—so limited, however, as only to equalize cost of production for grain and fruit spirits. The abolition of the tax on fruit brandies should be religiously opposed as a measure dangerous in the extreme.

3. That an increase in the tax on distilled spirits would greatly benefit not only all pure wine producers, but also the moral tone of the entire liquor traffic, should be constantly remembered.

4. That the market value of alcohol controls the average market value of all ordinary wines should be considered a fixed principle not to be overlooked at any time.

5. The relief demanded by sweet wine producers should be granted, but strictly limited to producers at the original places of fermentation, to a stated quantity not exceeding 14 per cent of alcoholic strength; wines so fortified not to exceed 24 per cent and not to contain less than 4 per cent of saccharine matter; no use of saccharine matter other than the

pure product of the grape to be recognized as legitimate, excepting pure crystallized cane sugar, and no spirits for fortification to be free from tax excepting pure grape distillates. These limitations are absolutely necessary to prevent demoralization of the whole industry through the temptations to fraud, deceptions, and adulterations. Producers of pure wines who ferment their own products should be permitted to procure grape brandies out of bond for fortification, subject to careful supervision of Internal Revenue officers to prevent fraud; this provision being necessary to satisfy wine makers who have no distilleries, and especially to promote harmony between producers in different States.

6. The advantage to be gained by obtaining the privilege to fortify sweet wines free from taxation would not compensate for the harm that would be done by violation of any one of the principles stated above, or by failure to enforce any of the limitations and restrictions mentioned.

The present condition of affairs is a lamentable one, but the difficulties under which we suffer, and the advantages to be gained by relief for sweet wines, should neither be exaggerated nor carelessly stated.

Under the laxity of the revenue laws applying to distillers of grape brandies, fraud in fortification of sweet wines can only be partially suppressed, and collusion with revenue agents can be practiced without fear of detection. The justice of the demands of the producers and a liberal interpretation of true intent of the law have in the past influenced the national administration to such an extent that very little attempt has been made to prevent the use of brandies by distillers in legitimate fortification of sweet wines. This overlooking of the strict letter of the law has, however, done more to demoralize the industry than strict enforcement can do harm. The majority of wine makers have not dared to assume the risks of acting under implied, but unauthorized, permission to do otherwise than as the law requires. Producers have not reaped profit from the situation. Wines have been offered in competition of trade in accordance with the cost of production. Those who have fortified at least cost have sold correspondingly low, and thereby made it impossible for others, who have been more scrupulous, to enter the market or to purchase tax-paid brandies for fortification. In some cases wine makers who were compelled to make sweet wines owing to over-ripeness of grapes, have been equally compelled to purchase grain alcohol for fortification, because it has been cheaper than tax-paid brandy. If the law had been strictly and continuously enforced, no doubt there would have been some diminution in the production of sweet wines; but the quality on the market would have been finer, different producers would have been engaged in it, and the prices would have been higher. The low prices of the past have benefited only the eastern jobbers.

The stringent enforcement of the law under the present administration has caused some good as well as some bad results; but worst of all is the tendency towards a general attack on the Internal Revenue system.

It has done good in compelling sweet wine producers to unite in demanding a change of the present law; also in bringing up the price of sweet wines so that legally made products may be profitably offered. This of itself, if continuously and honestly adhered to by the Government, will partly relieve our wine makers from necessity to use grain alcohol when they have no distilleries. The increase of price will, however, without doubt limit our production by rendering competition more difficult; the increase of revenue to the Government is not desired by

the people; in fine, the situation, while better than under unauthorized license, is not one of which Congress may feel proud. There is, however, no confidence in the permanency of the present policy of the Government, and there can be no guaranty of honesty on the part of its agents. Even now, doubts are freely expressed as to whether all wineries where sweet wines are made are equally supervised. The opportunity for collusion without fear of detection is certain to produce fraud, and no matter how pure the intentions of the Washington office may be, the people will believe that agents appointed through political influence will exercise favoritism more or less.

We cannot continue under these conditions of affairs without either one of two remedies being applied, viz: to enforce the letter of the law impartially, the Government must assume greater control of all fruit distilleries, appoint storekeepers, etc., or the right to fortify without tax must be granted. The first of these remedies would be costly to the Government and would necessarily restrict the number of distilleries, and so break up all the small producers for the benefit of a few rich men. Rather than to permit this result, viticulturists would prefer that the Government should simply tax all wines for the proportion of alcohol contained exceeding 14 per cent, taking no account of grape spirits at distilleries reconverted into wine. This might in some respects be the best of all remedies, because no tax-paid grain spirits could be used. The Government will not, however, give any consideration to new laws having in view the increase of internal revenue collections, as such are not needed.

Revision of Customs and Internal Revenue laws is the avowed policy of all parties, and the object is reduction of revenue; therefore, the present demand of sweet wine producers is in full accord with the governmental policy of the country, and no unreasonable opposition need be feared if our industry does not carelessly disturb other interests and political systems.

It is not because we ask relief from taxation that serious opposition is encountered, but because in asking such relief the method of obtaining it involves complications that are apparently difficult to harmonize.

In the first place, the system of collecting internal revenue is easily jostled by changes that give cause to fear openings for fraud. It is therefore absolutely essential that experts in the service shall be fully satisfied that the provisions of any new law relieving one class of producers from taxation shall not contain loopholes for a perversion of its true purposes. To this end the Commissioner of Internal Revenue becomes necessarily, by being called upon by committees of Congress, an important factor in framing the new law to suit the new demand. When our Commission presented the Sweet Wine bill and Pure Wine bill to Congress, it was the advice of Commissioner Miller and his assistants that was first demanded by both the Democratic House and the Republican Senate. With his aid bills were framed, which he was ready to approve as "operative for the purposes intended"—leaving no suspected loopholes for fraud, notwithstanding he objected to the general policy of passing them. During the future terms of Congress our producers must meet this same difficulty, for it is practically impossible to secure the assent of Congress to a bill which is reported by experts to be "inoperative," although Congress may override the opinion of the administration on a question of policy.

There is no reason to suppose that any organized hostility exists anywhere in this country against our industry, unless it be in the ranks of Prohibitionists. There is no reason to believe that a Republican protective tariff party desires to enlarge the scope of internal revenue influence. There is in reality no whisky ring; no ring of any kind to fear, although there may be in some parts some conflicts of interest. The Fractional Gallon bill, to which the first draft of the Sweet Wine bill was attached as an amendment, was favored by the distillers of Peoria, opposed by those of Cincinnati, and was a matter of indifference to those of Kentucky. Our Sweet Wine bill was warmly favored by Kentucky, Tennessee, and Maryland distillers, also by the pure wine makers of Virginia, North Carolina, and New York; opposed by the neutral spirit producers of Illinois, and the compounders of bogus wines of Ohio, and was a matter of practical indifference to the distillers of Cincinnati. The Peoria distillers happened to have special influence over Mr. Morrison through their local Representative, and that is the only reason the bill was not concurred in as an amendment to the Fractional Gallon bill. A very little trouble in conference with the Peoria distillers would have convinced them that they had nothing at stake worth fighting for; but the usual Granger fight occurred here just at the critical time, and nothing was done to complete a victory more than half won. The situation has not changed, except for the better. Now the committees of both Houses of Congress and the Treasury Department are in harmony politically, and it would be folly for our producers to work up a false excitement directed against the motives of the Administration, or in sympathy with those who would be glad to gain strength in favor of the abolition of the internal revenue system.

Recollect that when a Republican Congressman advocates abolition of all taxes upon distilled spirits, he is making more friends among Prohibitionists than among wine makers or distillers. Recollect, also, that when a serious outcry is made against the entire internal revenue service, it is very pleasing to a certain extreme school of Protectionists, who see in such a policy an easy road to overcome threatened dangers to the tariff.

It is more than probable that the demand for a rigid enforcement of internal revenue laws applicable to sweet wine came from some of our own producers, who found themselves unable to compete with illicit production. And we have more men to fear in this State who view vine growing and wine making only as a temporary speculation than we have active enemies among whisky distillers. There is now a disposition among some who are influential to trifle with the principles upon which our permanent prosperity depends. The man who would please both the Prohibitionists and the wine makers in such questions must be considered an unsafe leader for us. The man who will risk the greater interests of the whole industry to gain temporary relief for a small branch of our work must be invited to counsel with the whole body of producers before he is permitted to announce our policy.

I would suggest, therefore, that this Commission should call a Convention as soon as possible to determine, first of all, what general principles must be preserved at all hazards, and to lend collective aid to the sweet wine producers; also, that the sweet wine producers form an association to further their special wants in harmony with the interests of the whole, and that such association shall first disavow any intention of fostering any party opposed to the maintenance of the internal revenue service.

Respectfully submitted.

CHARLES A. WETMORE.

REPORT OF CHARLES A. WETMORE.

Read at the annual meeting, held June 9, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: By limitation of office, my term as Commissioner for the San Francisco Viticultural District has expired, and with it my position as President of your honorable body, although I still remain your Executive Officer by election of the Board of Commissioners. I desire to express my most sincere appreciation of the courtesy and confidence with which I have been uniformly treated as your presiding officer during the past two years.

As retiring President, I have no report to offer; as Executive Officer, I shall be ready to file my report as soon as I have completed certain revisions now being made, which pressure of other matters has delayed.

The most important question which has recently arisen requiring your serious attention is that involved in the late decision of the United States Supreme Court and the legislation now pending in Congress relating to interstate control of fermented and alcoholic liquors in unbroken packages passing into States where prohibition laws prevail. Very urgent appeals have been made to secure the influence of California against the passage of the pending bill to relegate to the States the entire control of this so called temperance question. Upon retiring from office as your President, I can think of no more important suggestion than this, viz: that the State Viticultural Commission of California should immediately direct its officers to urge the California delegation in Congress to favor the passage of the pending bill authorizing the several States to control the sale of fermented and alcoholic drinks, free from all interference on the part of the National Government. This question should be one of State control, and all differences of opinion should be suffered to be subject to State legislation. The defeat of the pending bill would result in national agitation, unwholesome and unnecessary.

A very general demand has been made by producers for an extension of the system of exhibiting viticultural products and private brands to important trade centers, such as New York, Chicago, and London. The plan adopted for the Platt's Hall exhibit, might, with some modifications, be followed in those cities as rapidly as the funds of the Commission permit. This method of popularizing our products is exceedingly popular and useful, and is opposed only in the interest of a few wholesale dealers who desire to monopolize all the profits of the industry. I am of the opinion that a special committee should be appointed as early as possible to take this question under consideration, or special instructions should be given to the Executive Committee expressing the future policy of the Commission in this respect.

Considerable indignation has been expressed by producers against the public charge, made by the California agent of the Agricultural Department of the National Government, Mr. George Husmann, reflecting upon the future prospects of California clarets. At a public Convention in San Francisco, from a written paper, he made the statement that "California would never excel in her clarets." This assertion, coming from one supposed to be in authority, in the face of the great success already achieved by our growers, is exceedingly offensive, as well as unjust, and should be repudiated by the United States Department of Agriculture.

In conclusion, I am happy to be able to congratulate producers upon their improved prospects for profitable markets. New elements in trade are being developed rapidly, and foreign markets are being tested by public spirited merchants, whose policy will be to grade and purchase our wines in accordance with relative merits. The depression that has prevailed during the last two years cannot continue much longer.

CHARLES A. WETMORE.

REPORTS OF CLARENCE J. WETMORE,

Manager of the Hall and Experimental Cellar.

FIRST REPORT.

Read at the annual meeting, held June 11, 1889.

To the Executive Committee of the Board of State Viticultural Commissioners:

GENTLEMEN: As Manager of the Permanent Exhibit and Experimental Cellar, I respectfully submit the following report, showing the work that has been accomplished up to the present time.

When the Commission decided to open a permanent exhibit of viticultural products, the store under the Mechanics' Library, on Post Street, was selected as the place for holding such an exhibit. After consulting with the Trustees of the Mechanics' Institute, the idea of taking the store mentioned was abandoned, owing to the many restrictions placed upon us, which if agreed to would have made it impossible to carry out our plan of work. After looking around for some time for another place, your committee decided to rent Platt's Hall, at a rental of \$350 per month. Upon receiving word from the Attorney-General that it would not be lawful for the Commission to sell wines or brandies on its own account, your committee decided to lease a portion of the hall for a café, in which wines on exhibit would be sold to those wishing to sample them.

Acting on instructions from you, I had the hall fitted up for occupancy. On the right of the hall offices were made for the use of the Commission, and a portion partitioned off for an exchange. On the left a portion was partitioned off for a café, and back of it a place was made to store the samples for use in the café. In the main center of the hall wire frames were placed, on which the samples sent by exhibitors were displayed. The cost of fitting up the hall was as follows:

Fixtures	\$445 00
Carpenter's bill	1,419 00
Plumbing	152 38
Painting	263 85
Vineyard scene	125 00
Wire frames	176 00
Furnace, etc.	283 91
Total	\$2,865 14

While the hall was being fitted up I sent out a circular to all the leading wine makers and merchants of the State. In answer to the circular thirty-five exhibitors have placed their wines and brandies on exhibition, and thirty-three of them have them on the wine list used in the café. Besides the samples of wines and brandies, there are exhibited a continuous still, fermenting and storage tanks, vineyard plow, wine pumps, combined stemmer and crusher, wine presses, elevator, corking machines,

bottle-washing machine, capping machine, corks, capsules, bottles, clarifying material, demijohns, etc.

Before opening the hall the café was leased to Mr. Pierre Klein, proprietor of the Occidental Restaurant, at a rental of \$50 per month. The hall was opened on January fifteenth, and Mr. Klein paid \$25 for the half month ending January thirty-first. It was then found that the profits derived from the sale of wines, being 10 cents for pint and 20 cents for quart bottles, was not sufficient to warrant him in paying such a rent; so no rent has been charged him since February first. The business of the café has been slowly but steadily increasing, but the profits are not yet sufficient to warrant the lessee in keeping it up, and a short time ago he signified his intention of leaving. A meeting of your committee was called on March thirtieth, and you agreed to allow him 20 per cent of the case prices on all sales made in the café, and to be allowed on sales from August first; this 20 per cent to be in addition to the service charge. On these terms Mr. Klein agreed to stay, and the café is still running.

You will see from the following figures that the popularity of the café has not decreased, but rather increased:

BOTTLES SOLD IN—	Number.	Corkage.	Cash Receipts.	Reserve Fund.
January -----	504	\$60 10	\$180 30	} \$42 50
February -----	572	61 40	196 10	
March -----	606	62 85	200 45	24 55
April -----	634	65 45	235 25	29 80

The Reserve Fund is the difference between the price per single bottle, after deducting the service charge, and the case price charged for one dozen bottles; out of this Reserve Fund the bills for printing the wine list are paid. About three hundred a month are printed and distributed to persons visiting the hall. Since the opening of the café, a great many eastern wine merchants have visited it, and have found out, by sampling the wine there, just the wines they wished to purchase. Others have been surprised at the fine wines exhibited there and have decided to go into the wine business. Residents of this city and Oakland, by visiting the café, have found out the brands of wine that suit their tastes, and are now regular customers of the exhibitors of those wines. One party ordered a pint bottle of nearly every wine on exhibition and had the lot sent to New York to be sampled there. These few instances show the good work the café is doing and demonstrate plainly that it must be kept up. The money received from the lessee of the café is deposited in the Anglo-Californian Bank. An account is rendered to the exhibitors every two months, and a check given for the amount of their sales.

Those parties who take an interest in the success of the café and come there often with their friends are the ones that reap the most benefit from it, as is shown by the sales made of their wines. Some of the exhibitors never enter the café, and seem to give it the cold shoulder. They do not seem to realize the fact that we are furnishing the best advertising medium possible, and at no expense to them. Those that try to make the place a success will reap the benefit in the end.

The plans for operating the Exchange Department have not as yet

been perfected. Your committee appointed a special committee, consisting of Arpad Haraszthy, H. W. Crabb, and I. Landsberger, being one merchant, one producer, and one broker, to draw up such rules as they thought best for operating this department. This committee met several times, but could arrive at no conclusions. It is hoped that something will be done soon to place this department in running order. A number of producers have made use of the lockers in the Exchange, and have placed their samples in them, and a few have effected sales. In this department I am prepared to test, free of charge, the amount of alcohol or acids in wines. So far I have tested twelve samples for alcohol.

READING-ROOM.

In the center of the hall a place is laid off for a reading-room. Country newspapers and periodicals are kept on file for the convenience of those wishing to use them.

EXPERIMENTAL CELLAR.

In the cellar connected with the hall a place was fixed to store the wines we had collected, and which, up to the time of occupancy of this hall, were stored in a cellar at Clay and Leidesdorff Streets. Most of the wines are in good condition, but the dry cellar is showing its effect on the white wines, and some of them are taking on a slight sherry flavor. It is very evident that white wines cannot be aged in such a cellar. I have no doubt but that good sherries can be made in our cellar, and would suggest that a room be fitted up for that purpose where the temperature can be raised above what it is now. Most of the wines in the cellar will need to be bottled before the end of the year, and for that purpose several thousand bottles will be required.

Last January I sent to the Paris Exposition, through the Department of Agriculture at Washington, D. C., two bottles each of the following wines and brandies in our cellar:

Zinfandel—1886 and 1887.
 Mataro—1886 and 1887.
 Carignan—1886.
 Mondeuse—1886 and 1887.
 Petite Syrah—1886.
 Cabernet Franc, Cabernet Sauvignon, and Verdot (blend)—1886.
 Cabernet Franc, Cabernet Sauvignon, and Merlot (blend)—1886.
 Cabernet and Tannat—1886.
 Burgundy—1886.
 Petit Pinot—1887.
 Johan. Riesling—1886.
 Franken Riesling—1886.
 Sauvignon Vert—1886.
 Chablis—1886.
 Sauterne—1886.
 Semillon—1886.
 Chauche Gris—1886.
 Meunier—1886.
 Port—1886.
 Brandy—1883 and 1886.

The samples were all labeled and marked No. 1, 2, 3, etc., with a record kept showing what wines corresponded to the numbers, so that if any mention is made of number due credit can be given the proper one.

Respectfully submitted.

CLARENCE J. WETMORE,
 Manager.

SECOND REPORT.

Read at the semi-annual meeting, held December 9, 1889.

SAN FRANCISCO, December 9, 1889.

To the State Viticultural Commissioners:

GENTLEMEN: As Manager of the Hall and Experimental Cellar, I beg leave to submit the following report:

It is now eleven months since the Permanent Exhibit and Viticultural Exchange was established in Platt's Hall, and I am happy to say that the undertaking has been a great success. Since making my last report six more exhibitors have placed their wines and brandies in the hall, while not a single exhibitor has withdrawn his exhibit. There are at the present time forty-one exhibitors, of which thirty-nine have their wines for use in the café. Alameda County has four exhibitors, Napa County eight, Sonoma County three, Santa Clara County five, Fresno County three, San Joaquin County one, Los Angeles County three, and Santa Cruz County two. Of the wine merchants who do business in San Francisco, eight of them have their exhibits in the hall.

The business of the café, although falling off for a few months, has kept up well, and the sales for November were the largest of the year. If all the exhibitors would take more interest in the success of the café, the place could be made one of the best distributing mediums in the State. Every facility is given exhibitors to show their samples and make sales, and those who have given the most attention and helped to keep up the success of the café have reaped the most benefit. A great many cases of different samples of wines and brandies on exhibit have been ordered sent to people in the East. One lot of seventeen cases was sent to a party in Washington, D. C., and he has written back that he is now better pleased with California wines than he ever was before. The following table will show the monthly sales made through the café during the eleven months of the year:

MONTH.	No. of Bot- tles Sold.	Amount Received.
January	503	\$240 40
February	514	257 50
March	537	263 30
April	547	300 70
May	411	218 00
June	317	162 95
July	328	173 95
August	331	170 90
September	298	161 50
October	614	281 15
November	617	282 90
Total for eleven months	5,017	\$2,513 25

The money was distributed as follows:

Corkage	\$505 70
Reserve Fund	204 75
Twenty per cent of case prices given to café	216 70
Paid to exhibitors	1,310 70
Freight and express charges	44 50
Balance due exhibitors	230 90
	\$2,513 25

From the Reserve Fund, \$84 75 was paid for printing the wine lists and \$4 90 for ice, leaving a balance of \$115 10. From three to five hundred wine lists are printed monthly and distributed to the people visiting the hall. I would suggest that a portion of the Reserve Fund be used in advertising the exhibit, so that strangers coming to San Francisco may be posted on what we are doing.

Plans for carrying on the Exchange Department have not yet been perfected. Quite a number of the lock boxes are used by producers to store their samples in, and a few sales have been made. In this department during the year I have tested fifty-five samples of wine for alcohol, which have been brought or sent to me from different portions of the State. Tests were made free of charge.

The wines in the Experimental Cellar have been cared for, and some of them bottled. During the past vintage I fermented two hundred and fifty pounds of Palomino grapes, and three hundred pounds of Pedro Ximines grapes, which were sent to me by E. W. Maslin, of Placer County. The wine made from the grapes I have kept separate, and will convert it into sherry. I also fermented two hundred pounds of Semillon, Sauvignon Blanc, and Muscadelle du Bordelaise grapes, from J. A. Hudson, of Elmira, Solano County. The wine is now in good condition, and promises well.

I will state that the only gold medal awarded at the Paris Exposition for California brandy was awarded to this Commission for the samples sent from our cellar.

The shortage on this year's wine crop has developed a better feeling in the industry, and I hope that the new work begun by this Commission will show even better results next year.

Respectfully submitted.

CLARENCE J. WETMORE,
Manager.

THIRD REPORT.

Read at the annual meeting, held June 9, 1890.

SAN FRANCISCO, June 9, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: As Manager of the Hall and Experimental Cellar, I respectfully submit the following annual report, showing the work that has been done during the past year: The plan of work outlined in my last yearly report has been carried out during the past year, and I am glad to announce that the work has been attended with more success than was at first anticipated. Since making my last annual report nine more exhibitors have placed their wines in the hall, and only one has withdrawn. Of the new exhibitors two are from Alameda County, four from Santa Clara County, and three from Fresno County. Altogether there are now forty-three exhibitors, and forty-two of them have their wines for use in the café.

Last December the Placer County people asked permission to make a display in this hall of the products of their county. The request was granted, and all the space possible was given them. The exhibit lasted

for two weeks, and during that time from thirty to forty thousand people visited the hall.

Permission was also granted the Fruit Union to hold their annual meeting in the hall. Accommodations have also been provided for the monthly meetings of the Grape Growers and Wine Makers' Association. Several applications have been received to rent the hall for other purposes, such as auction sales, lectures, etc., but the requests were not granted. If the Commissioners think it advisable to rent the hall for such purposes, the rent can be reduced considerably in that way.

The business of the café has kept up reasonably well, considering the support given to it by both producers and merchants. A number of the exhibitors have not entered the café during the year, and the work of keeping it up has been left entirely to a few exhibitors and the officers of the Commission. The result of their work is given below. United action on the part of the exhibitors would do much to increase the popularity of the place, and by so doing every exhibitor who has his wines for sale would be benefited. The following tables show the business done in the café during the year:

MONTH.	Number Bottles Sold.	Amount Received.
June	317	\$125 10
July	328	136 40
August	321	131 15
September	298	126 35
October	614	247 95
November	617	258 30
December	715	316 50
January	437	182 05
February	491	197 25
March	350	177 25
April	515	205 70
May	458	128 75
	5,471	\$2,232 75

The disbursements were as follows:

Paid to exhibitors	\$1,509 05
Twenty per cent premium to café	349 25
Reserve Fund	246 35
Balance due exhibitors	128 10
	\$2,232 75

The corkage on the wines sold in the café, allowed the proprietor, amounted to \$427 05, and this added to the 20 per cent on cased prices, or \$349 25, gives \$776 30 as the total amount the café received for the sale of wines.

The amount credited to the Reserve Fund from sales in the café since the opening amounts to \$344 50. From the sale of bottles, cases, and tules, \$68 50 has been realized and the amount placed in the Reserve Fund, making a total of \$413. The disbursements out of this fund were as follows:

Printing wine lists	\$84 75
Ice	4 90
Advertising	125 00
Special article in wine edition of "Examiner"	150 00
Checkbook	75
	\$365 40

Carrying a balance of \$47 60.

Through instructions from the Executive Committee I had our wine list printed in the special wine edition of the "Examiner," agreeing to pay for the same \$150 out of the Reserve Fund, and to collect \$5 from as many of the exhibitors as were willing to pay, and to turn the amount collected over to the "Examiner," the whole amount to be paid for the article not to exceed \$300. So far I have collected \$70 from the exhibitors. Three thousand copies of the paper were given us, and they have been mailed to all our correspondents. Already I have received a number of letters from parties wanting samples of wines, and asking how they can be sent to them.

The number of empty bottles on hand in the store-room is as follows:

Claret, quarts.....	36
Claret, pints.....	2,100
Hock, pints.....	365
Hock, quarts.....	66
Champagne, pints.....	149
Champagne, quarts.....	66
Brandy (white).....	50
Brandy (black).....	43
Sauterne, quarts.....	43
Sauterne, pints.....	33
Total.....	2,952

The amount received for these bottles, when sold, will be placed in the Reserve Fund.

During the year I have tested seventy-one different samples of wines for alcohol, and four samples for acid. The alcoholic test was made by means of the ebullioscope, and the acid tests by Twitchel's acidimeter. The above tests were made free of charge.

The wines in the Experimental Cellar have been cared for, but have not been bottled. Some of them need bottling, and I would suggest that the committee in charge of the Experimental Cellar examine the wine, and instruct me which samples to bottle. I would also suggest that a small room be fitted up in the cellar to be used as a sherry-room. The expense of fitting up such a room would be small, and the room can be heated by means of a gas stove. There are a number of wines in the cellar that I am endeavoring to make sherry of, but the development is slow, owing to the coolness of the cellar.

Several improvements are needed in the hall, but lack of funds has prevented the making of them. I would suggest the fitting up of the entrance in a more attractive way, and that more lights be put in the roof.

Respectfully,

CLARENCE J. WETMORE,
Manager.

REPORT OF ISAAC DETURK,

Commissioner for the Sonoma District.

SANTA ROSA, CAL., September 18, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I beg leave to submit the following viticultural report for the Sonoma District, as required by the blanks furnished by the State Board (for the new directory now being compiled), together with other matters coming under my personal observation, that may be of interest to the Board.

The work has been laborious, and has taken considerable time, as every section has been visited, and nearly every vineyard has also been visited.

Fully three fourths of the vineyards of the district are located on the hills and mountain sides, which made the labor of gathering statistics more arduous and difficult.

I have found in the district nine hundred and twenty-five vine growers who cultivate five acres and upwards. Of these, eight hundred and forty-two are located in Sonoma County.

The following statement shows the number of owners, acres in vines, and product of each county:

SONOMA COUNTY.

Vine growers having five or more acres.....	842
Total acreage in vines.....	22,683
Total acreage in bearing vines.....	21,053
Total amount of grapes, in tons, for year 1889.....	41,013

LAKE COUNTY.

Number of vine growers, five acres or more.....	48
Acreage in vines.....	1,061
Acreage in bearing vines.....	1,008
Tons of grapes, product of 1889.....	2,148

MENDOCINO COUNTY.

Number of vine growers, five acres or more.....	20
Acreage in vines.....	204
Acreage in bearing vines.....	183
Tons of grapes, product of 1889.....	343

MARIN COUNTY.

Number of vine growers, five acres and upwards.....	15
Acreage in vines.....	502
Acreage in bearing vines.....	441
Tons of grapes, product of 1889.....	637

RECAPITULATION.

Total number of vine growers in the district.....	925
Total number of acres in vines in the district.....	24,450
Total number of acres in bearing vines in the district.....	22,685
Total number of tons, product of 1889.....	41,141

To the total acreage in vines for the district might be added at least five hundred acres of small vineyards of less than five acres, planted merely for family use. This will increase the total acreage of the district to at least twenty-five thousand acres in round numbers.

The total number of acres planted to table grapes exclusively is four hundred and eighty-five, the varieties being Muscat and Tokay.

From personal observation and from conversation with the vineyardists and wine men of the district, I have obtained the following information on subjects pertaining to the grape and wine interests:

The great body of vines in the district are planted on rolling hills, or on the mountain sides, exposure to the sun being observed in the location of the vineyard. The soil upon which vines appear to produce the best quality of grapes—especially for wine purposes—is either a red gravel, or clay, or white volcanic ash, in which there are more or less properties of iron. This character of soil is confined almost exclusively to the hill and mountain lands, and hence the greater number of vineyards are located on higher lands.

The valley lands produce a greater growth of vine, and a larger yield of berry, but at the expense of quality.

The product of the year 1889 has been somewhat difficult to arrive at, as many vineyardists lost a great part of their crop by the early rains; yet by a careful approximation the result of the report has been arrived at.

The vineyards all over the district are looking exceedingly well, and I find no failure, except in the Sonoma Valley. Here the ravages of the phylloxera have decimated many vineyards, the pest slowly but surely creeping along the whole extent of the valley. So far no remedy against this insidious enemy of the vine has been discovered. The only recourse the vineyardist has, is to replant with resistant vines. This is being generally done, although many vineyardists have become discouraged, dug up their vines, and planted their ground to other crops.

But little additional acreage has been set to vines in the past two years. Those planted will about equal the number torn out and killed by phylloxera.

In a few localities the effect of the low prices obtained for grapes last year is apparent, the vineyards having been neglected and not properly cultivated. The result is that a poor crop will be gathered on these lands.

The great body of vine lands and vineyards are to be found in Sonoma County. The counties of Marin and Mendocino, with a long fog belt extending inland fifteen or twenty miles, have but little land favorably situated for vine growing. Late frosts prevent the realization of a crop in the valleys of northern Lake and Mendocino Counties.

The southern portion of Lake County is admirably situated for vine growing, the climate and soil being all that could be required; yet the great distance to market and absence of transportation facilities have made vine growing unprofitable, so far, in this section.

Many vineyardists contemplate setting out more of their lands, or resetting dead vines with the table varieties—Muscats, Tokays, etc.—as they appear to be longer lived, and resist the ravages of the phylloxera better than other vines. At the same time they command a better price in the markets.

But little loss has been sustained from mildew or sunburn the present

season. What loss has been incurred from these causes is due to carelessness and injudicious pruning.

The grape crop of 1890 will average about the same as that of 1889.

There are many thousand acres of good vineyard lands, as yet unimproved, not only in Sonoma, but in Lake and Mendocino Counties. In the last two counties named, the hill lands—where thermal qualifications are favorable—appear to be especially adapted to growing a good quality of the grape, the soil being almost wholly the red gravelly clay, or volcanic ash, considered best for the grape. At the same time, these lands are as yet comparatively cheap. The low prices obtained for grapes the past few years, as well as the stagnation ruling in the wine market, added to absence of transportation facilities, have kept these valuable vine lands from being improved. With a better market, and more favorable conditions, these sections will become heavy vine-growing districts.

By far the largest variety of grape grown in the district is the Zinfandel (this being peculiarly the wine grape). The Golden Chasselas, Burger, and Black Malvoisie come next, while some vineyardists affect a mixture of all the foreign varieties.

At present, most of the wine cellars of the district are empty, or nearly so, the vintage having been shipped to the market or stored.

A large proportion of the present season's grape crop in the northern part of Sonoma and the southern part of Lake County has been contracted to parties for drying purposes.

It has been impossible to obtain an estimate of the wine manufactured in the district during the past year, as the cellar-men have been inclined to be reticent on that point for fear the information might have an unfavorable effect on the wine market.

A considerable quantity of the wine product has been, and is being, manufactured into brandy.

In conclusion, I will say that I have used every endeavor to obtain a complete and exact report as required by the State Board, and nothing has been omitted that careful attention could accomplish.

All of which is respectfully submitted.

ISAAC DETURK,
Commissioner for the Sonoma District.

METEOROLOGICAL RECORD

Of Observations Taken by Station Agent George R. Stone of the Southern Pacific Company, at Santa Rosa Station, from August 1, 1888, to August 31, 1890, a Period of Two Years.

MONTHS.	TEMPERATURE.			Rain-fall—Inches.	WEATHER.		
	Max.	Min.	Mean.		Number of Days Clear.	Number of Days Cloudy.	Number of Days Partly Cloudy.
1888—August	98	50	71	-----	20	1	10
September	95	53	64	1.62	20	3	7
October	85	35	63	-----	18	1	12
November	81	32	53	3.48	15	11	4
December	69	40	51	5.37	5	23	3
1889—January	69	28	47	1.77	23	7	1
February	72	25	44	.35	22	5	1
March	79	35	53	7.92	15	14	2
April	81	43	58	1.09	14	12	4
May	83	42	59	2.93	15	13	3
June	88	52	65	.25	24	3	3
July	90	46	67	-----	25	1	5
August	86	45	66	-----	24	-----	7
September	90	42	65	-----	24	3	3
October	82	44	62	8.78	14	17	-----
November	76	34	55	4.39	17	13	-----
December	66	32	49	9.47	9	22	-----
1890—January	60	27	42	12.84	6	25	-----
February	66	28	43	4.74	10	17	2
March	68	34	53	6.13	11	19	1
April	78	40	53	1.82	14	11	5
May	95	43	62	1.40	18	8	5
June	86	42	64	-----	23	2	5
July	100	51	67	-----	25	-----	6
August	88	48	65	-----	20	1	10
Totals	-----	-----	-----	82.33	431	232	99
Average	84	35	57	41.16	18	9	4

REPORT OF E. C. PRIBER,

Viticultural Commissioner for the Napa District.

NAPA, August 20, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: It is not very gratifying for the undersigned Commissioner for the Napa District to make his annual report at a time when the conditions of the wine industry are so deplorable as they are at present; but it is with special pride that we can claim for this district, that with all the hard times, the low prices for wines, and the terrible destruction by phylloxera, it shows wonderful improvements, and has gained, during the past few years, a high reputation for the qualities of both its wines and brandies.

The difficulty found in disposing of the young wines at a remunerative figure has forced many growers to hold their products, to buy the best oak cooperage, and to build new cellars. This, as it might be called, "forced retention of aged wines," has enabled them to seek and to find a profitable market with the consumers here and outside of the State.

NAPA COUNTY

Has improved immensely in its cellar facilities. Of nearly five hundred growers, more than one hundred make their own wines. About fifty of them have stone cellars, partly underground or tunnels. The total cooperage in the valley reaches ten million gallons.

While it is true that very little wine of Napa Valley is offered on the San Francisco wholesale market at present, large quantities of the last three vintages are still held by the growers, who can give their product proper care and time to develop those qualities which command a remunerative figure.

These terribly hard times have taught this valuable lesson: that not all wines made are excellent, and not all can be judiciously aged; and thus learning to discriminate, the grower prefers to send all doubtful wine to the distillery to putting it on the market, or to aging it, and by doing so injuring both his reputation and that of his district.

We have thirty-five registered distilleries in Napa County, which have reported to the Internal Revenue Department two hundred and forty-two thousand one hundred and eighty gallons of brandy, from October 1, 1889, to August first, of this year. Quantities of this brandy have been shipped to Europe, where our Napa brandies have gained an excellent reputation.

The ravages of the phylloxera have been more noticeable than ever before. Only about 10 per cent of the fifteen thousand acres are planted in resistant vines. The experience with resistant vines in France, where the production is now rapidly increasing, in consequence of the replanting of those vineyards which were destroyed by the phylloxera, should teach us a lesson. It cannot be impressed too strongly upon our growers

that the replacing of their diseased vines by *Riparias* is the only true salvation for their vineyards, and it might be advisable for our Board to consider if our funds, and the law which appropriates them, would not permit the furnishing of *Riparia* roots to the wine growers. We would also recommend to use all efforts in inducing the growers to pull out and burn up all diseased vines, the present condition of affected vineyards in this State containing these diseased vines making them hotbeds for the propagation of this plague. Experience has shown that where diseased vines have been pulled out and destroyed, the progress of the phylloxera has been comparatively slow.

This year's crop in Napa County will be smaller than those of 1888 or 1889. The shortage is caused mostly by the ravages of the phylloxera, and somewhat by coulure and sunburn. The Zinfandel, which is by far the most predominating grape, did not set as fully as usual, and will yield a light crop. The white grapes are looking very healthy, and give promise of a beautiful crop.

SOLANO COUNTY

Is one of the few counties where table, raisin, and wine grapes (suitable either for drying purposes or the manufacture of sweet or dry wines) are cultivated to perfection. This county has about three thousand acres in bearing, of which about one thousand acres are used for table grapes. The product of five hundred acres is made into raisins, and one thousand five hundred acres are in wine grapes.

In the northern part, around Dixon, we have about five hundred acres in grapes, nearly one half of which are cultivated for raisins alone. The balance of the grapes will be dried this year—in fact, most of them are already contracted for. In former years, a couple of hundred tons of grapes were sent from this neighborhood to the wineries at Cordelia, Napa City, and San Francisco. No wines will be made in this locality the present year.

In the Vacaville section, including Pleasant Valley, most of the grapes are sold for table use. The few vineyardists having wine grapes will dry the present crop. In Pleasant Valley a great many vineyards are partially destroyed by phylloxera. Vineyards near Vacaville look healthy, are well taken care of, and do not show much signs of phylloxera. They prove to be an excellent investment this year. Only a few small wineries exist here, the production of which does not figure largely in the great market.

The vineyards around Cordelia, including Suisun, Fairfield, Benicia, and Green Valley, are planted solely to wine grapes. The climatic conditions do not favor raisin culture and scarcely permit the drying of their product. We have many wineries in this vicinity, which, as the phylloxera has made considerable progress, and has destroyed already hundreds of acres here, are fully able to handle the present crop, which looks very promising. Some grapes near Fairfield make very good sweet wines, but the larger part of the product of the wineries is light, dry wines from grapes grown on the hills surrounding Green Valley and the slopes near Benicia. Solano County may now have two hundred thousand gallons of wine in its different wineries and cellars, and will produce not more than five hundred thousand gallons this year.

CONTRA COSTA COUNTY,

Which produces largely table grapes, lost a considerable portion of last year's crop by early rains. This year's crop is very promising. The wine production in the county may reach four hundred thousand gallons during the coming vintage.

Respectfully submitted.

E. C. PRIBER,
Viticultural Commissioner for the Napa District.

REPORT OF CHARLES BUNDSCHU,

Commissioner for the San Francisco District.

SAN FRANCISCO, October 25, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I am gratified in reporting to you that the state of viticultural matters pertaining to the Third, or San Francisco District, may be considered in a fair condition of prosperity.

The depressing and unfavorable circumstances that impaired the healthy advancement of the industry for some time past, appear to be supplanted by a feeling of renewed confidence and hopeful expectation.

I find that in all the different sections comprising this extensive district the stock of old wines held in first hands is limited, and that the new vintage could be taken care of without difficulty. Although special inducements have been offered this year for the preparation of dried grapes on a larger scale, sufficient wine grapes have been reserved for wine-making purposes to make our vintage a very abundant one, and sufficiently large to replenish the stock for the regular trade requirements.

SANTA CLARA COUNTY.

Santa Clara County has developed into one of the great centers for the production of red wine varieties, and the general characteristics of the wines—good color and body—make them a desirable product for the great bulk of our export claret. The Charbono variety, extensively cultivated in the past, has been largely eliminated and replaced by grafts of the Burgundy and Bordeaux types, greatly increasing, thereby, the value of the product. Some of the finest claret types are grown in this wonderful section, especially in the mountain regions, and after undergoing proper treatment and cellar handling, their merits must and will command general approbation and appreciation. They have compelled recognition heretofore, and will continue to grow in public estimation hereafter.

SAN MATEO COUNTY.

San Mateo County is also making strenuous efforts to increase its acreage of vineyards. Its vineyardists are planting out the choicest varieties in the mountain regions, evidently well adapted for the cultivation of the vine. These new vineyards will soon come into full bearing and will undoubtedly produce satisfactory results.

SANTA CRUZ COUNTY.

The Santa Cruz Mountains District has had good opportunity to show its superiority in many respects. The wines are not very heavy in alcohol, but develop a most delicate flavor and highly distinctive aroma.

which may be attributable to the proximity of the ocean. The yield of the vines is generally light, and cultivation is more difficult and expensive than that of the valley lands, but the result shows immense possibilities, limited only by the degree of skill and knowledge of the vineyardist to assist Nature's efforts and to overcome difficulties of fermentation and development.

ALAMEDA COUNTY.

Alameda County, and especially Livermore Valley, appears to have made the most formidable progress in the general rivalry for the production of the higher types of fine table wines. The distinction of the highest awards of merit that were accorded to the products of this now famous district by the Paris Exposition of 1889, must be considered evidence of superiority of climatic conditions and adaptability of soils, especially to Sauterne and Bordeaux varieties, as well as the wine makers' skill and careful methods of making, treating, and ripening their products.

So far as general statements may be relied upon, the Third District is free from the attacks of the phylloxera, and although no serious apprehensions are felt on the part of the wine growers, abundant provision is made for the introduction and propagation of resistant vines. In fact, some newer vineyards of the district have been entirely planted with resistant stocks and grafted with the most approved varieties.

CONDITIONS OF TRADE.

The conditions of trade have not been very favorable for our California growers for some time past. Although the shipments from this port and interior points show a healthy increase in volume, prices have declined to a remarkably low and unprofitable standard. One of the principal reasons for this unfavorable condition of affairs in the past is undoubtedly an over production of inferior wines, which, under the ordinary pressure of commercial competition, have found their way into the channels of trade, and under competitive prices have degraded the prestige, and dragged down the prices of our superior products. The general opinion that all our wines should have a certain age before they could advantageously be placed on the market has induced many to hold their products for future prospects. It should be remembered by all parties interested:

First—That only a limited portion of our wines can be safely placed aside for storing and aging, and that quality alone can form the criterion for judicious selection.

Second—That the conditions essential for preservation, for the improvement, and for the maturing of wines into a really fine product, must be thoroughly understood.

Third—That when the fundamental conditions of original soundness, excellence of quality, and the means of preservation, coupled with the knowledge of methods, are wanting, all attempts at aging wines will most assuredly result in failure, sacrifice, and disappointment.

When only eight or ten years ago it was firmly asserted by representative authority, and published all over the State, that California could never produce too much wine, and that the then prospective vintage (variously estimated at forty to fifty million gallons) would be readily disposed of; when it was stated that the happy owner of an hundred

acres of bearing vineyard would be the enviable possessor of an estate equal to an independent fortune—then nobody anticipated that even the largely reduced yearly quantity of about eighteen million gallons could bring about a disastrous flooding of the wine market. That the prophetic glorification of the future of our industry was not to be realized up to the present time, is due in great measure to the fact that our American population are very slow in adopting the habit of drinking wine in moderation—a habit almost as old as the world, and to-day indulged in by the most enlightened and cultured nations of Europe.

The planting and growing of a vineyard is only the beginning of the problem of "making wine," the solution whereof is its profitable marketing. The production of ordinary wines may be comparatively an easy task, but the selection, nursing, and aging of wines of superior quality is an accomplishment acquired only after untiring application and experiments, coupled with natural ability and skill.

I am most happy to note quite an advance among the growers of this district in all the qualifications of successful wine men, and in proof of my assertion I point to the improvement, especially in the quality of wines made these last two years. I doubt not but that the future will show still better results and bear witness to the correctness of my judgment.

I look upon our past and present struggles as an unavoidable reaction from over-sanguine expectations, which must naturally adjust itself, and then the wine industry will once more be established on a basis remunerative to all.

Respectfully submitted.

CHARLES BUNDSCHU,
Commissioner for the San Francisco District.

REPORT OF GEORGE G. BLANCHARD,

Viticultural Commissioner for the El Dorado District.

PLACERVILLE, CAL., August 18, 1890.

To the Board of State Viticultural Commissioners:

I am pleased that in making this report of the general condition of viticulture in the El Dorado District, I am able to give the Board a more reliable account of the progress and extent of vine growing than I have been able to do in any former report.

For the purpose of better acquainting myself with the absolute condition of this branch of industry, I have quite recently made extensive visits into the counties of Yuba, Sutter, Nevada, Placer, Amador, Calaveras, and Tuolumne; and have received reliable information in relation to the subject of viniculture in the counties of Mono, Inyo, and Mariposa.

I am informed by the several Assessors of the counties of Alpine, Plumas, Sierra, and Mono, that there are no grapes of any kind raised in those counties, except it may be a few experimental vines, planted more for experiment and curiosity than from any idea of profit.

Grape raising, either for wine, table, or raisins, in my district is principally confined to the counties of Placer, Amador, El Dorado, and Calaveras. However, I have found some very fine specimens of raisins and fine qualities of wines produced in the counties of Nevada, Yuba, and Tuolumne.

The raisins of Placer and El Dorado Counties have long been known to the raisin market as superior in quality, those of Placer County having taken the first premium at the Citrus Fair held in Sacramento in 1887.

El Dorado County, having been the site of the discovery of gold in California, necessarily had attracted to it the earlier immigrations to California; and to the gold mining was added, at an early day in its history, that of viticultural pursuits. The early vineyards were planted to what is known as the Mission grape. Probably some of the oldest vineyards in the State, outside of the Missions, are to be found in El Dorado County, planted when no other grape was known in the State except the Mission variety. As the foreign vines became introduced into the State, they necessarily found their way into this county, so that to-day we have vineyards of the finest foreign varieties. The soil and climate, to an altitude of two thousand eight hundred feet above the sea level, is found to be conducive to their growth to perfection. This adaptation of soil and climate is not confined to the growth to perfection of any particular kind of grape, but extends to the whole family and species.

Except in the county of Placer, and there only to a limited extent, have vine pests of any kind affected the vineyards.

The vines, from an altitude of six hundred feet to that of two thousand eight hundred feet above the sea level, have a uniformity of growth,

healthfulness, and producing qualities. Those of the higher altitudes contain much more of saccharine matter than those of the lower altitudes.

Those grapes cultivated for table use, such as the Tokay, Emperor, Rose of Peru, and Muscat of Alexandria, obtain, in the higher altitudes, a greater degree of perfection in color, richness, and consistency than those grown in lower altitudes. The Flaming Tokay, at an altitude of two thousand feet, arrives at that peculiar color from which originated its sobriquet of "Flaming," and has that degree of brightness not to be found in those grown in the lower altitudes. The Muscat of Alexandria is relieved of that green appearance which it has in the valley counties, and possesses in the foothills a rich golden appearance; and it also has a more pronounced richness of the Muscat flavor.

In the counties of Yuba, Nevada, Placer, El Dorado, Amador, and Tuolumne, there is more or less wine made of a very superior quality. In Yuba, there is a winery whose annual product runs into the hundreds of thousands of gallons, owned and operated by Mr. G. Sieber. At Nevada City, there is also a winery, owned and operated by the Nevada County Wine Company, producing some ten thousand or fifteen thousand gallons of wine annually. In El Dorado County, there are several wineries, all producing a first class quality of white wine, and some of their red wines command the highest price in the market!

The wines of Mr. George Sieber, both red and white, dry and sweet, will compare favorably with those of any other section of the State, and are the product, I was informed, of the grapes raised in the foothills back of Marysville. All the grapes converted into wine at the Nevada Winery are raised in the higher altitudes of the grape-producing regions of Nevada and Placer Counties, none of the grapes being raised at a less altitude than from two to three thousand feet.

The grape-producing regions of my district will cover, from Yuba to Inyo Counties, an area of from twenty to thirty miles in width, by from two hundred and fifty to three hundred miles in length; and of all this vast region, there is not a thousand acres but what is susceptible of producing the finest qualities of grapes of any variety, either for wine, raisin, or table use.

Profit being the great desideratum of all industries, and especially those that require so much labor and expense as that of grape culture, wine, and raisin making, as to this vast area, the great distance to market, and almost total want of facilities for transportation, have caused this industry to be neglected; for no matter how complete an adaptability there may be, both in soil and climatic condition in this region, unless the industry can be made profitable, it will find but very few who will embark in it.

It is strange to observe, and yet true, that very little sulphur or other curative articles are used in any of the vineyards in these localities, there being no apparent need of their use, especially in the higher altitudes of the grape-growing regions.

On account of this distance from market and want of transportation facilities, very few new vineyards have been planted in the last year or two. In Placer County, there has been a marked increase of acreage in the planting of vines in the last year, which, on account of the facilities for transportation to market, have been mostly table and raisin varieties.

Since the establishment of this Commission it is observable in all of the vine-growing localities of my district that there has been a constant increase in the cultivation of those superior varieties of foreign vines, both for wine and table use; and also through the advice and information in wine making, given to our wine makers and viticulturists through our Chief Executive Viticultural and Health Officer, there has been a most remarkable advancement in the art of wine making and grape culture generally.

At no distant date, when railroads shall have been extended so as to reach these grape-producing lands to such an extent as to afford facilities for cheap transportation, this whole region to which I have alluded will be one vast vineyard, giving employment to thousands of laborers and adding vastly to the wealth of California.

Inasmuch as the Board of State Viticultural Commissioners are engaged in the compilation of a new directory of the grape growers, wine and raisin makers, I shall omit in this report any extended history of the development this industry has attained in my district, and ask those interested in and desirous of the information to consult this new directory for the same.

GEORGE G. BLANCHARD,
Commissioner for the El Dorado Viticultural District.

REPORT OF ETHELBERT DOWLEN,

Special Agent to Investigate the Anaheim Vine Disease.

Being one of a series of forty-three reports now on file at the office of the State Viticultural Commissioners, and read at the annual meeting, held June 9, 1890.

To the Board of State Viticultural Commissioners:

In September, 1888, the Board of State Viticultural Commissioners decided upon making an investigation into the causes of the destruction of the vineyards of the Los Angeles District. The disease which was the cause of the trouble had then been at work for at least four years, and is still working, though with lessened virulence, and it has proved to be, probably, the most destructive disease that has ever attacked the vines of this country, quite equaling in its power for evil either black rot or phylloxera.

At the beginning of the investigation, which was placed in the special charge of Hon. J. DeBarth Shorb, a series of questions as to date of attack, soil, varieties grown, and their resisting power, practice in cultivation, etc., were sent out to the principal vine growers of the affected district. Five hundred circulars were sent out. One hundred and one replies were received. Nine replies were from parties who had given up viticulture; there were, therefore, ninety-two replies from persons actually engaged in vine growing. The information given in these replies has been tabulated and sent in. (Reports 15, 27, 28.) A special set of circulars was also sent to those vineyardists who were in the habit of regularly sulphuring their vines; the information on this point is tabulated in report 15.

The answers to circulars gave particulars as to thirty-six localities and forty-six varieties of vines. So far as the information given in these replies goes, it seems that the disease (variously known as "Los Angeles disease," "Los Angeles rot," "new disease," and "mysterious disease," but named by the Commission the "Anaheim disease") which has been the cause of all the trouble had been working in the vines for at least four years previous to 1888.

The earliest date of attack reported is 1884, when it was first noticed in North Pomona and Anaheim, the former locality being at least twenty miles northeast of Anaheim, a range of hills running between the two places.

The disease then spread from Anaheim, apparently remaining almost, if not quite, stationary at North Pomona.

The dates of first attack at various points are given below:

Anaheim and North Pomona in 1884.
Santa Ana in 1885.
Orange, Tustin, Fullerton, McPherson, Los Angeles, San Gabriel, Alhambra, and Burbank in 1886.
Lamanda Park, Florence, Tropic, and Vernon in 1887.
Verdugo and Maynard in 1888.
Riverside, El Cajon, and Sweetwater Valley were not reported until 1889.

The above dates give the period when attention was first drawn to the altered condition of the vines in the various localities; in all probability the disease had been present for some time previously. One thing is evident, the vines were first attacked seriously in and around Anaheim and Santa Ana, sweeping all through the Santa Ana Valley, spreading thence northwesterly to Los Angeles, thence eastward along the San Gabriel Valley to Azusa, through Lamanda Park and Sierra Madre, where, however, it has not done much damage. Northward from Los Angeles the disease went along the San Fernando Valley, through Tropico and Burbank, even jumping the Soledad Mountain, and reaching Maynard, in Antelope Valley, at over two thousand feet above sea level.

In 1889 the disease made a jump over into San Diego County, appearing first in El Cajon Valley, and afterwards in the Sweetwater Valley. The districts around Los Angeles seem to have suffered about alike, but not to the same extent as the Santa Ana Valley.

The same disease was noticed by Prof. F. L. Scribner and Prof. Pierre Viala, in Napa Valley, in 1887, where it was again seen in 1889; but in this district it has never done any harm.

With respect to the resisting power of the vines, the Mission and Muscat varieties were first affected, and have suffered most; the Burger, Mataro, and Trousseau come next; the Carignan and Grenache have suffered slightly; the Blaue Elba scarcely at all; the Lenoir and Gamay Teinturier have escaped altogether. The wild vines have also been attacked.

It does not seem that irrigation or non-irrigation, soil, time and manner of pruning, or climatic conditions, can be claimed as being the prime cause of the disease, though each of these may have some bearing upon the case. Altered climatic conditions were at one time somewhat strongly urged as the cause of all the trouble, the wet season of 1884 having been followed by the first noticeable attack being advanced as proof. If there is anything in this view, the exceptional rainfall of the past winter should be followed by increased severity of disease; instead of this, the reverse is the case, as there is at the present time (June) much less disease amongst the vines than at the corresponding period of last year.

Respecting the manner in which the disease manifests itself, the following are the chief points: The earliest symptoms of attack are shown by a few of the leaves exhibiting peculiar yellow spots and patches. These leaves may be found on one or two canes only, or they may be scattered over the entire vine. These spots, at first small, often spread until almost the whole of the leaf blade is involved; sometimes only one side of the leaf is affected. The spots may remain as irregular patches, or may occupy all the space between the principal veins of the leaf, in which case the cellular tissue is discolored, whilst the fibro-vascular ribs remain green, forming a very definite pattern. In black varieties the yellow patches turn red, and eventually become brown and dead. In white varieties the yellow spots retain their color until they become brown and dead. The edges of the leaves become dead, and curl up over the upper surface of the lamina of the leaf; eventually the leaf dies, and often the lamina drops off, leaving the petiole attached to the cane. In the second year, soon after the vines have started, many of the young leaves, when about an inch in diameter, have their edges blackened and

curled up as though scorched or badly frosted; the leaves which are afterwards produced will show the same markings as those first described. At the same time as these changes take place in the leaves, the fruit may be attacked; some of the berries, or perhaps all, in a bunch will shrivel, and, in the end, dry up, in which case they will remain hanging on the vine; or the development may be arrested, in which case the fruit, if it ripen, will be hard and sour. The fruit may be attacked at any time from the opening of the blossom, or occasionally a little before then, until the first coloring of the berries.

In the second year of disease, the canes are, many of them, dwarfed and much crowded on the main stock; if they are of larger growth, they are often flattened and have their internodes shortened.

In the third year, the growth is very much reduced, the canes are often only a few inches in length, and the vine usually dies before the end of summer, though sometimes it will live on for another year. It not unfrequently happens that in each year diseased vines will put out suckers which, at first sight, appear very strong and healthy, but these, too, in the end, die in the same way as the rest of the vine.

Usually, the vines will live on for three years from the first attack, though sometimes they will struggle on for five years, or, as in the case of some Mataro vines, they will die in a short time from being first attacked. The Mataro vines referred to were attacked suddenly in August, 1888, the leaves dropped, and the fruit dried upon the vines, and before winter many of the vines were dead. Those that were left, came out somewhat weakly in 1889, and again went under shortly after the hot weather set in, and practically the whole plot was dead before the winter of 1889.

The canes of diseased vines show the following features, in addition to those noted above: Many canes do not ripen at all, even though they may have made a fair growth; others are ripened only on one side; others have patches of unripened wood and bark; these unripened patches and stripes often turn greenish brown and black on the outside. Internally, the characters are as follows:

In the earlier stages of disease, the wood, though still green, is drier and lighter colored than in healthy canes. Soon yellowish and brown spots and streaks appear in the woody bundles. Eventually the whole of the wood becomes dark brown and moist, the pith also becomes darkened, and the inner bark becomes blackened, so as to show in a transverse section, as a black ring around the fibro-vascular bundles. The medullary rays sometimes show darker than the rest of the woody tissues. The bark is also easily detached from the wood. Similar characters are also found in the spurs and stock, and later on, in the roots as well.

The sap ceases to flow as a watery fluid, but oozes out from the cut surfaces of canes or stem in transparent, colorless, gummy masses.

The disease always travels downwards. The tips of canes die first, and it is quite easy to find canes, which apparently are quite green and healthy at their junction with the stem, but which are quite dead for at least half the distance from the tip. On cutting such canes longitudinally, the transition from fresh green wood to that which is dead and brown is plainly seen.

The same course is taken by the disease in cuttings. Amongst the cuttings taken at the time of pruning in 1888-89, many were found to have developed disease after being put in the nursery, and it was found

to be always the case that the disease started at the upper end. Some cuttings were purposely planted in an inverted position, still the result was the same—the disease always started at the end which was naturally the farthest from the main stem, whether that end was placed in the air or in the soil. Cuttings taken from presumably healthy vines, and brought from a distance, have not always proved to be exempt from disease, but have shown the first signs in the first year of planting.

There is also often a rapid increase of disease in a vine immediately after pruning. This was noticed in the pruning season of 1888-89, and again during the last pruning season. In one instance spurs were observed to die back five inches within seven days after pruning.

Under the microscope, the tissue of diseased canes always show the same characters, which are as follows:

In those canes which remain unripened, and in those which appear to be drier than is normal, it will be found that starch is either altogether absent or is present only in scattered grains, few in number and small in size, which often appear to be eroded. These scattered grains are often discolored, and sometimes do not readily turn blue on the application of iodine. In those canes which have one side ripe and the other side unripe, the tissues of the ripened portion are almost always well supplied with starch—some starch will always be found—whilst in the unripened portions the tissues will be altogether devoid of starch. In the discolored areas of the woody bundles, the components of the tissues are seen either to have their walls simply stained brown or else the cell cavity is partially or wholly filled up with a dark brown deposit; this is especially the case with the blackened inner bark above mentioned. The larger ducts and vessels are often seen to be more or less filled up with thylles, which are developed sometimes to a great extent. Threads of mycelium are also found in more or less abundance running through the various tissues. Bacteria are found more or less plentifully, and various forms of fungi are abundant upon the canes of diseased vines.

No insects have been met with which could have anything to do with causing the disease—in fact, the vines of this district are seldom affected by insects of any kind, a very rare invasion of army worms, or an occasional attack of cut worms, being all that has to be contended with, there being no phylloxera in this district.

The above are the chief features presented by vines affected with the Anaheim disease. What this disease is, cannot positively be stated at present. It may be that more than one disease is concerned in the death of the vines. None of the ordinary diseases of vines, such as anthracnose, black rot, downy or powdery mildews, the various root fungi, or phylloxera, are concerned in the case.

At present the Anaheim disease stands side by side with certain European vine diseases, which have not yet been worked out, though they have been known and studied for a long time.

The malady to which the Anaheim disease bears the greatest likeness is mal-nero, which has been known in Sicily and Italy for many years past, and where it has been studied for the last twenty years, having been first recognized, according to M. Cugini, in Sicily, in 1863.

The general characters of mal-nero are as follows: The internodes of the canes are shortened and flattened instead of remaining cylindrical.

According to M. Gregori, the leaves are spotted with yellow and red, and present on these spots small drops of resinous substance. The fruit bunches dry up. A transverse section of the stem shows the wood to be spotted brown or black. The bark is only slightly adherent and is brown. The entire wood becomes altered, and the roots still appear healthy when the stem and branches are much changed.

Under the microscope it is seen that, in the altered cells, the starch, which is normally present, has disappeared, or looks as if gnawed, and is brown. It changes color with difficulty on application of iodine. The members of the cellular tissues are brown; in the interior of the vessels there is a great increase in the number of thylls, and there is an abundant deposit of thick brown matter. Bacteria are also abundant.

Vigorous shoots are often put forth from the stem near the ground, or even from the roots. The disease always travels down from the main stem to the roots, and the vine finally dies in from three to five years.

From the above it will be seen that there are many points of resemblance between mal-nero and the Anaheim disease. Still there are some points of difference; *e. g.*, the case of the Mataro vines which were suddenly struck down; other instances of a sudden attack after a spell of hot weather have also been reported. To a certain extent these cases of sudden attack resemble folletage rather than mal-nero, as folletage most frequently happens after heavy rains, and during great heats. Under an attack of folletage, vines will suddenly lose their leaves, even the canes will sometimes dry up, and the vines die soon after. But whilst with folletage vines are only killed here and there, and the trouble does not spread, in the case of the Mataro vines above referred to almost entire blocks were killed, and the trouble continued into the following year. Moreover, the attack did not succeed heavy rains.

As with the Anaheim disease, so with the mal-nero, nothing is positively known as to the cause of the malady. Opinion is still divided amongst Italian scientists as to whether mal-nero is due to the action of parasitic fungi or not, most of the Italian authorities being of opinion that these fungi are not the cause of the disease. In the Anaheim disease, fungi are abundant upon and in the diseased vines, but whether as cause or effect is not yet known. In this connection it may be remembered that the habits of some parasitic fungi, at any rate, are liable to change.

The fungus of white rot (*Coniothyrium diptodiella*) was at one time classed as a saprophyte only; it is now certainly known to be parasitic, and the fungus of black rot (*Levstadia Bidwellii*) has been found in parts of New York State, northern Ohio, and the islands of Lake Erie, to be rather saprophytic than parasitic in its nature.

The Anaheim disease has probably existed in this State for many years past. It was noticed in Napa County in 1887, and again in Napa Valley and Livermore Valley in 1889, but in each district vineyardists stated that it could not be the new disease, for it had been known to them for years, and had never done any harm beyond killing a few vines now and then, and that it would come and go. The same was found to be the case at Riverside, where, also, vineyardists stated that they had known that affliction of the vines for years, and that sometimes a vine would die, and sometimes it would recover.

It will be seen from the above, that either there are considerable variations of the same disease, or else that more than one disease is at work; The different modes of attack, the different results in different parts of

the State, and the different appearances of the leaves of the diseased vines, are points not yet reconciled to each other. Professor Henri Grosjean, of the French Ministry of Agriculture, writing to Hon. J. DeBarth Shorb on the Anaheim disease, February 26, 1890, says: "We have not yet heard of a disease presenting the different characters described in Mr. Dowlen's letter, and we would not be surprised to be in presence of several diseases." Professor L. Paparelli, of the University of California, a pupil of Professor Targioni Toretti, writing May 19, 1890, says: "For my part, judging by the samples and description of the Anaheim vine disease, I should think that not the mal-nero alone is in question, but two or three maladies together, perhaps all of a non-parasitic nature." This question has also been referred to in Report No. 34.

With respect to remedies, partial success has been reached. In December, 1888, a small hothouse was erected by the Viticultural Commission, in which rooted vines, both healthy and diseased, of different varieties, were set out for observation and experiment. Unfortunately, soon after the vines had been set out, one end of the house was accidentally burned out, and almost all the vines were killed. Whilst the damage was being repaired, a second house was built onto the first, the cost being defrayed by the Los Angeles County authorities. By the middle of February, 1889, both houses were started with a fresh supply of cuttings and rooted vines of the varieties mostly grown in the district. Many of these were known to be diseased. Of the cuttings thirty-six were of the Mission variety. The rooted vines were several times treated with a mixture known afterwards as "Ongerth's powder." Part of the cuttings were also treated with this powder, and with modifications of it, both in solution and as powder. The cuttings were set out in rows of four each, two in each row being dressed, and two being left untreated to serve as checks. All the rooted vines grew well, and nearly all the cuttings started. By the end of April both houses were full of vines, and by the end of June the growth had so increased that quite a third of the rooted vines had to be taken out. Through the summer of 1889 the vines were left to themselves, except that occasionally they were supplied with a little water. In October, 1889, most of the vines were cleared out to make room for a fresh supply, when it was found that of the Mission cuttings nearly all the untreated plants were dead, whilst of the treated cuttings only two had died. All the rest had made large growth (completely hiding their dead companions), which was quite healthy. Three of these healthy plants were reserved. Of the rooted vines three Missions, diseased when put in, were quite healthy, and three Muscats and one Burger, also diseased when put in, were only very slightly diseased. These vines were all reserved, and, up to the present time, except for a little damage by sunburn to one of the cuttings and damage from gophers to one of the Muscats, these vines are all in good health. The treatment has been continued this year. Fresh vines, much diseased, were brought in during last December and January. Some of these were treated with various substances; others were untreated. At the present time, all the treated vines are in much better condition than those left untreated.

In the vineyards not so much success has been reached. Last year the above mentioned powder was applied experimentally on three vineyards, having a total of about one thousand acres. Three applications were made, one just before the vines started, one just after starting, and

a third in June. The disease had shown itself rather early, and after each application the disease was undoubtedly checked, and a new and healthy looking growth was induced, but by the end of the season the disease had apparently reasserted itself. The powder has been tried by different vineyardists, some of whom speak favorably, and others unfavorably of it.

Other substances have been tried—iron sulphates as a dressing to the ground, Bordeaux mixture, benzine introduced into the sap circulation, superphosphate of lime as a ground dressing. Some of these seem to have been of benefit for a time, others have had no appreciable influence.

The present outlook is encouraging. The vines were rather late in starting, but in all cases they have made excellent growth, with promise of a large crop of fruit; this is the case with all varieties, Mission included. Even where the vines were left unpruned, and the ground uncultivated, the vines having been condemned on account of their badly diseased condition, a strong, healthy looking growth has been made. The signs of disease in the early part of the year were very few, and there has been but little increase, and it is possible that the disease may pass away. But too much confidence must not be placed in this state of things, as the hot weather of the next three months may bring about a change for the worse, as the vines must of necessity be still in a very weak condition.

ETHELBERT DOWLEN.

JUNE 1, 1890.

The suggestion at the close of the above report, that "it would be well not to place too much confidence in the then condition of the vines," has unfortunately turned out to be only too well founded. Since the above report was written, the hot spells of June, July, and August have, in places, done considerable damage to the vines, though the total mischief should not be credited to the Anaheim disease, as drought and sun heat have each played a considerable part in the damage done.

ETHELBERT DOWLEN.

AUGUST 1, 1890.

REPORT OF J. B. J. PORTAL,

Special Agent to Investigate the Market for Dried Wine Grapes in Europe.

In 1888 the State Viticultural Commissioners resolved, in view of the depression then existing in the wine market, and the prospect of finding a market for California dried wine grapes in France, to give the whole subject a thorough investigation. Accordingly, Mr. J. B. J. Portal, a prominent vineyardist of San José, who was then going to Europe on business, was intrusted with a special mission to investigate this subject and submit a report. His reports came in from time to time, but in view of the recent and almost prohibitive tariff placed by France on products of this description, it is believed that the present chances of opening up a market in France are very slim indeed. The reports of Mr. Portal, and the letter of instructions given to him, are as follows:

LETTER OF INSTRUCTIONS.

SAN FRANCISCO, CAL., April 29, 1889.

J. B. J. PORTAL, *Esq.*, *New York*:

DEAR SIR: It having been represented to this Commission that you are now on your way from this country to France on business of a private nature, connected, however, with the development of commerce in California wines; and it being known to our Commission that you are familiar with the present condition of viticulture in California, by a unanimous vote of the Board during a special session held on the twentieth instant, you were specially requested to devote a portion of your time, or so much thereof as you can spare from private business, to the investigation of the following subjects:

First—To what extent is there a market in France for dried wine grapes for wine-making purposes, and to what extent may the same be increased, or rather to what extent may it be possible for the vineyardists of California to obtain a share of this market for their dried wine grapes.

Second—In what portions, or in what cities of France, is there a market for dried wine grapes; what is their relative importance in the trade; what is the present source of supply of dried wine grapes; what distinctions are there made in the various qualities as supplied by the trade, with respect to their relative market values—as, for instance, distinction relating to color, quantity of sugar contained, fine qualities for wine making, etc.; to be even more particular, would there be any distinction in value in dried grapes produced from Zinfandels, Missions, Rieslings, or Burgers.

Third—What are the names and business addresses of the persons engaged in importing, dealing in, and manufacturing for wine purposes, dried grapes in the most important sections and places in France engaged in that industry?

Fourth—Are the dried grapes required for this French market packed in any special manner, and are they required to be with or without stems?

Fifth—At what season of the year could dried wine grapes shipped from this State be utilized in France, or, in other words, would the element of time in transportation, whether by sailing vessel around the Horn, or by steamship via the isthmus of Panama, or by rail across the continent, materially affect the disposition of these products in France.

Sixth—Give us any information as to the value of California dried wine grapes, such as you know would be likely to be dried, in comparison with prices paid for dried grapes of different qualities from other countries.

Seventh—If you can conveniently devote a portion of your time to these questions, and report as early as possible, in time for the vintage of this year, you will render an important service to this State; and in order to aid you in this respect, this Commission respectfully commends you to the kind attention of all who may be able to give you information on these subjects.

Yours respectfully,

CHARLES A. WETMORE,
President.

CLARENCE J. WETMORE, Secretary.

FIRST PARTIAL REPORT.

MARSEILLES, FRANCE, June 11, 1889.

To the Board of State Viticultural Commissioners, San Francisco, Cal.:

GENTLEMEN: It takes a great deal of tact and time to get anything that a Frenchman calls a secret. However, I think by averaging the most contradictory opinions, I can give you the true manner of action at this time, so that you can take the responsibility of advising the vine growers and wine makers of California as to what they should do.

First—It is not profitable, at the present price of dried grapes in the French market, to ship from California. This price is 20 francs per one hundred kilos, delivered at Bordeaux, Marseilles, or Havre.

Second—No merchant will buy any dried grapes until a fair sample of at least one hundred pounds be sent to him for proper experiment. All say that they know nothing of dried California grapes, but are very willing to try them, and report at once.

I cannot give you here a full report of what I have seen and done at Bordeaux, Narbonne, Beziers, Marseillan, Marseilles, Cette, Montpellier, and Paris, but will later. I have the verbal opinions and business addresses of the most important merchants of the above dried grape centers.

My opinion is that the best interest of all concerned is to cultivate the American markets. There are here at Marseilles, merchants shipping dried grapes to New York, Mexico, and South America, and to many other places, that on account of their position should be supplied by California.

It would be advisable to dry a small lot of each kind of grapes and send them to France next winter, so that California, after proper reports, could be ready for the market, if any should develop in the future.

If you desire me to investigate the market in New York, let me know, and I will stop there on my return to California in July.

I regret very much that my report is so discouraging, but these are the facts, and the investigation has been thorough.

I remain, gentlemen, yours respectfully,

J. B. J. PORTAL.

SECOND REPORT.

SAN JOSÉ, CAL., March 4, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: In my letter to your honorable Board from Marseilles, France, I promised some additional facts when the supplies of dried grapes sent by your Commission to me in Paris should have been received and properly analyzed. I will endeavor to answer the questions in the order as per your letter of instructions, dated April 29, 1889.

First—To what extent is there a market in France for dried wine grapes, etc. The market for wine grapes at present is very depreciated, and has been so for over a year. Unless there is material change, it is not possible for California vineyardists to obtain a share of the little market now existing.

Second—The principal cities that now deal in dried grapes are, or have

been, Cette, Marseilles, Bordeaux, Marseillan, and Montpellier, and are supplied principally by Greece and Turkey in Asia at from 15 to 20 francs per hundred kilos. No particular variety is demanded, but the price paid is always according to the highest degree of alcohol they contain. They go from 28 to 34 liters of alcohol per one hundred kilogrammes of raisins.

The principal grape that Turkey furnishes ranks between 28 and 30 liters of alcohol per hundred kilogrammes. Their best variety is the *Thyra*, and sells at 15 francs per hundred kilogrammes, net, at Bordeaux, Cette, and Marseilles.

Greece furnishes the *Corinthe* and other varieties of a higher quality than Turkey, and range in alcohol from 32 to 34 per cent, therefore commanding as high as 20 francs per hundred kilogrammes. But at these figures there is neither profit nor demand.

Third—The principal dealers in dried grapes are:

Talbot Freres, 73 and 74 Rue de la Rousselle, and 2, 4, 6, 8, and 10 Rue Reniere, Bordeaux.

Henri Flamiset, druggist, seul vendeur du sucre Zenamai et importeur de raisins secs, Comptoirs a Smyrne (Turquie d'Asie) a Patras (Grece) et 15 Rue des Menuts, Bordeaux.

Alphonse Bousquet, Quai Vaulan, Cette (Herault).

Frich et Dormont, Cette (Herault).

Pascal, Fabre & Co., Marseillan (Herault).

Jean Voisin, Marseillan (Herault).

Leon Barral, Prop'r de Vignes Americaines, 11 cours des Casernes, et 2 Rue Brenys, Montpellier.

Bessede Fils, Marseilles.

M. Dufour, 16 Rue d'Antin, Paris.

Fourth—The packing is simply in substantial sacks. It does not matter if the grapes are stemmed or not. They may bring a little more without the stems.

Fifth—The fast transportation of dried grapes from California to France will only add to the cost of the product, as the market is about even all the year round, and the European crop being nearer the market, would always be ahead of the California product. It appears to me that shipping around the Horn by sailing vessel would be the best mode of shipment.

Sixth—California grapes of an average quality, and of the kind shipped by your Commission to me in Paris, in June last—and analyzed at my request by the "Laboratoire de la Societe des Agriculteurs de France," showing that one hundred kilogrammes produced 39.75 liters of absolute alcohol—would naturally bring the highest price in Europe, being higher than any other grape sent there up to this time.

I did not see the grapes myself, as they arrived too late, but I had them analyzed by the best authorities known, as you will see by the return of analysis marked 6,148:

REPORT OF ANALYSIS. (Translated.)

LABORATORY OF THE SOCIETY OF AGRICULTURE OF FRANCE, }
336 Rue Saint Honore, Paris. }

Specimen of dried grapes submitted by M. Dufour, of 16 Rue d'Antin, Paris, and received the twenty-first of September, 1889. Composition:

Glucose (inverted sugar).....63 per cent.

One hundred kilogrammes of these raisins has the equivalent of 39.75 liters of absolute alcohol.

Respectfully submitted.

J. B. J. PORTAL.

FINAL REPORT.

SAN JOSÉ, CAL., August 30, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I think that at the time of my last report to your honorable body on the dried grape question, with which I have been charged, the conditions of the market were less favorable in tone than they are already this season. France, Germany, and England are inquiring at what figures California dried wine grapes—red or white—can be obtained, while our home market seems to increase rapidly, and orders have been already received for the 1890 crop. There are now several establishments in London and in Germany organizing to utilize large quantities of dried grapes, and as the analysis made at my request by the Agricultural Analyst of the French Government has proved the California grapes to be higher in alcoholic product than any others introduced into the French market, it is reasonable to expect that in the years 1890 and 1891 large contracts will be made in California at remunerative figures for all the dried wine grapes that can be produced in the State.

Respectfully submitted.

J. B. J. PORTAL.

RAISINS.

An address delivered by B. N. ROWLEY, Esq., at the Seventh Annual Viticultural Convention, August 14, 1889.

There is some talk at present of overproduction of raisins in California, and that the planting of grapes for raisin purposes should at once cease. Let us glance over the situation, reviewing the raisin-producing districts of California, sections where the raisin grape grows to perfection, and where the climatic conditions are such that raisin making can be carried on successfully in all its branches.

Aside from the districts already occupied, there are some remote outlying districts or sections in the State that will some time in the future be brought within the scope of what might be properly termed "raisin-producing districts." The further extension of our transportation facilities will bring this about. At present the producing and curing districts of California are limited to Fresno, Tulare, Woodland, Yolo, Riverside, and portions of San Bernardino County, the El Cajon Valley of San Diego County, and the Santa Ana, Tustin, Orange, and McPherson Districts of Los Angeles. The latter is practically out of the field for some years to come at least, the vines having been destroyed by disease. Four years ago this section had an acreage equal to the production in 1888 of four hundred thousand boxes of raisins. Unfortunately the vine disease reduced this possible yield to the small quantity of forty thousand boxes, with the prospects of a smaller yield in 1889.

It is not possible to produce raisins in every section of the State where the Muscat and other varieties of raisin grapes grow to perfection. A section of the country in which the industry of raisin growing and curing can be successfully carried on, should be possessed of an even temperature and a dry climate during the ripening and curing season; should be devoid of cold and cloudy days, foggy nights, or showers and wind storms during the months of June, July, August, September, and October. These are combinations of climate, to say nothing of soil qualifications, that are not found at every cross road, even in California, so that we find the sections especially adapted to the cultivation of grapes for raisin purposes are limited even in our wonderful State.

A section of country selected for raisin making should be known as an early one; the bulk of the purchases of raisins are made from what is known as the "first crop," which should be cured and shipped for what is known as "early delivery." The first deliveries of the season, as a rule, prove the most profitable.

While the sections of country adapted to raisin making are limited in number, they are subject to considerable expansion beyond the present point of production. The planting of raisin grapes has been engaged in very extensively during the season just passed, and the large acreage devoted to raisins in 1887 and 1888 has been very largely increased during 1888 and 1889. Without any doubt, the present acreage five years hence (1894 or 1895) will all be in full bearing, and will

represent a possible production of upwards of two million five hundred thousand boxes of raisins, including all kinds and grades. While there is at present and always will be a very full supply of common and poor grade raisins, the supply of choice "London Layers" and fancy grades will not be fully up to the demand for years to come. Out of the possible two million five hundred thousand boxes of raisins there will be but a possible eight hundred thousand boxes of "London Layers," or choice stock. Our population is increasing largely year by year, and hence the natural increase in the consumption of raisins will be large. Naturally, when "Old Spain" produces very large crops, and they are permitted to be thrown upon the American market, prices will rule low. There is a remedy for this through the proper adjustment of our tariff laws.

The question is frequently asked, "Will it pay to plant raisin grapes, and further increase our already large acreage?" To answer that question intelligently, you should be posted as to the quantity of foreign raisins that are imported into the United States annually, as well as the amount of raisins produced in the State of California, in order to arrive at a close approximation of the consumptive demand. In answer to the above, we would say that the growing of raisin grapes will always be found a profitable venture in California if properly attended to.

In planting a raisin vineyard, you must, in the first place, know where to plant; second, how to plant; and third, but not least, how to care for and cure the crop.

The quantity of raisins (foreign) imported into the United States for the seasons of 1887 and 1888 was forty million five hundred thousand pounds, equal to two million and twenty-five thousand boxes of twenty pounds each. The consumption of raisins in the United States for any one year is practically represented by the quantity packed in this State and the quantity imported from foreign countries during any one season. Figuring upon that basis, we place the consumptive demand at three million two hundred and seventy-five thousand twenty-pound boxes for the seasons of 1887 and 1888. The pack of raisins in the State of California for the year 1888 we place at one million two hundred and fifty thousand boxes.

A number of growers and packers have, by their close and careful application to the business, earned a lasting reputation for their California raisins, for which there will always be a good demand and ready market at paying prices. The grower who thoroughly understands the business in all its branches, grows, cures, and packs his own crop, will realize the largest returns. With the small grower this is impossible, for he cannot successfully pack and market his own crop.

The raisin business is divided into three classes:

First—The large grower who packs and markets his crop under his own brands.

Second—The grower who sells his crop on the vines, or cures it and sells it in the sweat boxes.

Third—The professional packer who is not a grower, but has grading and packing houses established in the various raisin districts throughout the State.

Few, if any, of the raisins imported from Spain reach this country as packed by the producers or growers in that country. The raisins are cured in the producing districts, packed and shipped to the exporters, who maintain large warehouses or repacking establishments, where the

goods intended for the export trade are regraded and repacked under the immediate supervision of the exporting merchants, who thoroughly understand the wants and requirements of the various markets and countries to which they ship.

As to the acreage at present devoted to raisin grapes in California, after spending considerable time and carrying on an extremely extensive correspondence, we place it at twenty-one thousand acres. This represents the vines of all the raisin districts of the State ranging from one to sixteen years of age, many of which will be in bearing this season. A considerable increase in the yield may be expected in the near future from the new vineyards that have been planted this season, and from the grafting of a large number of vines, heretofore devoted to wine purposes, with the raisin grape.

A healthy, well cared for raisin vineyard will produce, when in full bearing, an average of from five to six tons of grapes to the acre. There are several large vineyards in the State that average, year in and year out, better returns than this, while there are many vineyards the average of which does not exceed three to four tons to the acre. In a good year, under favorable conditions, it is safe to calculate four tons of raisin grapes to the acre. Figuring on a basis of twenty-one thousand acres of vines in bearing in this State, the annual yield would be one hundred and sixty-eight million pounds of grapes, out of which it is possible to make fifty-one million five hundred thousand pounds of raisins of all grades, which, if boxed, would fill two million five hundred and seventy-five thousand twenty-pound boxes. You will notice that we say "possible to produce." While it may be "possible," it is not probable that any such quantity of raisins will be produced, as there are very many reasons why such a production from the present acreage will not be realized for many years to come, if ever.

Now, let us consider the situation of our competitors at Malaga, Spain. This district produces a large, thin-skinned, finely flavored raisin, which has become famous the world over for these qualities, and virtually offers the only competition from which California growers need have any fear. The importation of raisins from Malaga into the United States has fallen off materially during the past seven or eight years. The reason for this is attributed by some to the fact that California raisins have so improved in quality and quantity that they have virtually driven the Malaga raisin out of the market. While it is a fact that California raisins have come in direct competition with the imported Malaga, and have exerted a powerful influence in the direction of reducing importations, yet it is not true that the noticeable decline in the receipts of raisins from that section is entirely due to the competition from California. The receipts of Malaga raisins into the United States commenced to decline about seven years ago—1882—at which time we were importing over one million boxes. The falling off in the importations has continued ever since, and in 1888, we find the quantity imported reduced to the small amount of about one hundred thousand boxes of twenty-two pounds each. The causes for this rapid decline are the ravages of insect pests, vine diseases, crop failures, and loss of money by producers.

The total crop of the Malaga District for the year 1878 was two million one hundred and eighty thousand boxes, and of this quantity the United States received one million one hundred and eighty-three thousand boxes. In 1879 the crop amounted to two million one hundred

and twenty-five thousand boxes. The United States received one million one hundred and forty-six thousand boxes. In 1880, the crop was two million and fifteen thousand boxes, and the United States received one million one hundred and fifteen thousand boxes. At this point the very noticeable falling off in the crop of Malaga raisins commenced. In the year 1881, there were produced one million eight hundred thousand boxes, and the shipments to the United States were one million boxes. In 1882, the crop was one million eight hundred and sixty-eight thousand boxes, of which the United States received nine hundred and sixty-eight thousand boxes. These statistics show the total crop of the Malaga District for the five years above mentioned to be nine million nine hundred and eighty-eight thousand boxes, while the receipts into the United States during that period were five million four hundred and fifty thousand boxes. This proves that we have been receiving and consuming more than one half of the total crop from Malaga, while England takes the credit of being the principal market, and only received during the same period nine hundred and twenty-five thousand boxes.

There is a prevailing impression that the cost of production at Malaga, owing to the low price of labor, is very much less than the cost of production in California. This is a mistake. While it is true that the Spanish crop is grown, cared for, and harvested by what is known as "European cheap labor," on the other hand, their methods of cultivation, manner of handling, curing, and packing their crop are such as to swell the cost of production to such a point that farmers barely make expenses, particularly at the present time, in the face of the active competition from California, where raisins are produced at a very reasonable cost, owing to our improved methods and labor-saving machinery.

The producers have been losing money on their shipments for several years past, and the fight they have had to make against vine diseases, insect pests, etc., has thoroughly discouraged them, and they have allowed the quantity and quality of the Malaga crop to materially decline. At this point we will quote from a private letter from Messrs. W. Bevan & Co., of Malaga, Spain:

"Within the next two or three years there will again be a large production of Malaga raisins; the improved and more economical methods of working the vineyards, harvesting, and shipping the crops will enable our farmers to produce a box of raisins, it is believed, cheaper than it can possibly be done in California."

Mr. Bevan, the gentleman we have just quoted, has just returned to his home in Spain, after an extended visit throughout the Eastern States and the State of California. While in this city, after having carefully inspected our raisin vineyards, he expressed himself as not only being well pleased, but agreeably surprised with what he saw, and stated that if it were possible for him to dispose of his holdings in Malaga that he would consider very seriously the matter of coming to California and engaging in the raisin business. "No place in the world," said Mr. Bevan, "holds out such promises for the future of raisin growing as does the State of California."

People in Malaga are alive to the California competition, and, we are informed, have induced English capital to come to their assistance. From a private letter we quote:

"While last season's crop, 1888, was a very small one, and this season's

will be but little better, preparations are being made with the expectations of a heavy business in Malaga raisins in the near future."

That other causes have been at work reducing importations of Malaga raisins other than California competition, is shown by the fact that in the year 1882, while there was a marked decline in the importations from Malaga, the production in California was less than one hundred and twenty thousand boxes of all grades. The year 1883 shows a still greater falling off, and the California crop amounted to but one hundred and forty-two thousand boxes. In 1884, when our total imports from Malaga amounted to but seven hundred and forty thousand boxes—a falling off of three hundred thousand boxes—the California crop amounted to only one hundred and seventy-five thousand boxes of all grades. Out of this production in California during the year 1884 there were but a possible fifty or sixty thousand boxes of "London Layers," or a grade that would come into competition with the product from Malaga.

As soon as the Malaga District recovers from the effects of insect pests and vine diseases, and again becomes productive, California growers will find Malaga a very formidable competitor. In 1887, California produced eight hundred thousand boxes of raisins, and of this amount about two hundred and fifty thousand boxes would represent the quantity of "London Layers" produced that would come into competition with those from Malaga. By this it will be seen that the total quantity of "London Layers" and fancy grapes produced in California, and the total quantity imported from Malaga during that year, were five hundred and thirty-six thousand boxes, or about one half the quantity usually imported during any one year from Malaga prior to 1882, when the failure of the Malaga crop commenced. During the year 1888, California produced one million two hundred and fifty thousand boxes of raisins, of which amount five hundred thousand boxes represent "London Layers" and other choice grades. Our total importations from Malaga during the year 1888 amounted to one hundred thousand boxes from a crop of five hundred and forty thousand boxes. Again, we find that the total production of choice grades of California raisins, and the total importations from Malaga, amount to but five hundred thousand boxes, or considerably less than one half our former importations from Malaga alone. The lesson to be learned from this is that California has not driven Malaga raisins out of this market, but that the production of Malaga raisins has materially fallen off in quality and quantity, and that other markets are taking more than heretofore.

In regard to raisins from the Valencia District, which is one of the largest producing districts in Spain, and from which the United States receives annually very large quantities of raisins, it must be said that they are of a low grade, and used principally for cooking purposes; and while we do not fear Valencia as an active competitor, it may be well to inquire into the production and situation at that point.

During the season of 1888, the crop at Valencia fell short of expectations, being considerably damaged by rain; but nevertheless the crop amounted to sixty-five million pounds. Of this amount the United States received thirty-one million pounds. In 1887 the crop was seventy-nine million pounds, and the United States received thirty-two million pounds. The largest crop produced at Valencia for many years was during the season of 1882, about the commencement of the decline at Malaga, when the Valencia crop amounted to eighty-three million pounds,

of which the United States received forty-three million pounds. From these figures it will be readily seen that Valencia would prove no small competitor, provided California raisins came into competition with those from Valencia. The quality of the Valencia raisin is such—owing to the small percentage of saccharine or grape sugar they contain, and their poor keeping qualities—that they will never rank as a competitor of the California raisins, which are notably rich in grape sugar.

In summing up, we find that we have not reached the point where California can be relied upon to supply the entire consumptive demand of raisins in the United States. This demand will naturally be on the increase. Vine diseases, insect pests, crop failures, and climatic causes generally, will reduce the output of our raisin crop somewhat. California growers can maintain the present high standard and reputation for California raisins, and we need not stand in any great fear of foreign competition; but before planting the entire remainder of the raisin-producing sections of this State with raisin grapes, it would be well to give due consideration to the facts and statistics which I have furnished you to-day for your consideration.

SUCCESS OF RESISTANT VINES.

Written especially for this Report by JULIUS DRESEL.

We are now in the midst of our vintage, and every one may judge for himself how dreary an aspect the vineyards present around Sonoma, a place famous all over the United States for the best wines in California. I therefore think it opportune to make some remarks about that strange sight of an intelligent community listlessly standing by, waiting for something to turn up, while the vineyards, once the pride of our eyes, fall dead, acre after acre, from the extended flats at the mouth of our lovely valley clear up to the tops of our lofty hills. It is strange, indeed.

Finally, something happy really turns up. The prices for grapes actually rise from 30 to 50 per cent. Zinfandel bring \$15 to \$17 and Gutedel and Rieslings, \$18 to \$20. Cabernet Sauvignon is in demand for even \$27, but not to be had. Besides, there is good reason that similar prices will prevail for the next few years and better wine prices may follow in consequence.

With \$15 and \$20 per ton the wine grower can make his occupation a profitable one, and with this the main objection against replanting is void. The phylloxera has certainly lost some of its terrors since the resisting American stock has been planted and grafted with entire success on a stretch of over four hundred acres between Haubert's and Rufus' vineyards.

Twelve years ago Dresel & Co. began to introduce Lenoir from Texas, and Riparia, Herbemont, Elvira, and other resisting stock from Missouri, all of which were dropped in favor of Riparia, on account of its good growing qualities and remarkable adaptability to all kinds of soil. Riparia did equally as well on the hillsides and flats, in sandy or clayish as well as in loamy soils.

In grafting, its junction with the scion presented no difficulty. Stem and graft developed about evenly, and bear abundantly to the present day red or white grapes of French or German origin, of high flavor or of neutral character. At present, dead vineyards are more worthless than naked land. By renewing them with resisting stock, the value of the land may be raised to \$300 and more per acre. Therefore, I advise replanting. Cuttings are cheap. Lenoir and Riparia may be had in Sonoma and Napa. They should be planted in the nursery for one year, remain two years in the vineyard, then grafted in the third year during March, April, and May, and in the fifth year they will bring a fair crop. Cleft grafting is quickly done; anybody can learn it easily enough. An experienced hand can finish from one hundred and fifty to two hundred in a day.

The most important thing to observe in grafting is: Cut the stock even with the soil, or better half an inch above it, and then heap the soil in a mound around the graft to protect it against wind and sun.

After the graft has taken, say in September, remove the mound and any roots that may have grown from the scion. Now the vine is perfect. If the grafting has been done below the surface of the soil, it will be necessary every year to dig around the plant and remove all roots that will form on the scion, or else these roots will draw the nourishment from the leaves to the detriment of the resistant roots below. Phylloxera will then appear, kill the upper roots, and the vine becomes sickly or dies.

I expressly state that we met, apart from the cost, no serious drawback in this replanting experiment of our one hundred and fifty acres, and assert that it would be a tedious search to find a single vine that has died. On the other hand, we will be pleasantly remunerated this year by the sale of fifty thousand gallons of wine raised exclusively on American stock.

In plain view of these facts, how is it possible that so many of my fellow wine growers in Sonoma Valley persistently decry my happy success in replanting, spreading the ridiculous report that the resistant stock in our vineyard was dying out as fast as the remnants of the old plantation? Is it not a curious freak of human nature to belittle a promising result, instead of sympathizing with an experiment that might redound by imitation to the general benefit of our devastated valley?

Colonel Gardner, of the Census Bureau, when taken through our vineyard, was astonished at what he called a wonderful crop of grapes in so young a vineyard, and he made a corresponding report to Washington about the success of resisting stock at Sonoma.

But those who still doubt the correctness of my statements, I refer to the testimony of so experienced viticulturists as Messrs. D. D. Davisson, O. W. Craig, Chas. Kohler, and John O'Brien, of Sonoma, and I. DeTurk and L. Burris, of Santa Rosa, who have visited our vineyard for investigation, and left convinced, as I am myself, that our fellow wine growers could do no better than replant dead vineyards with American resistant stock at their earliest convenience.

JULIUS DRESEL.

SONOMA, October 7, 1890.

TARIFF AND SWEET WINE BILLS.

Appended will be found the full text of the McKinley Tariff bill in regard to all alcoholic liquors, and of the "Sweet Wine bill," which was included in the tariff measure:

TARIFF BILL.

SECTION 329. Brandy and other spirits manufactured or distilled from grain or other materials, and not specially provided for in this Act, two dollars and fifty cents per proof gallon.

SEC. 330. Each and every gauge or wine gallon of measurement shall be counted as at least one proof gallon, and the standard for determining the proof of brandy and other spirits or liquors of any kind imported shall be the same as that which is defined in the laws relating to internal revenue; but any brandy or other spirituous liquors, imported in casks of less capacity than fourteen gallons, shall be forfeited to the United States; *provided*, that it shall be lawful for the Secretary of the Treasury, in his discretion, to authorize the ascertainment of the proof of wines, cordials, or other liquors, by distillation or otherwise, in cases where it is impracticable to ascertain such proof by the means prescribed by existing law or regulations.

SEC. 331. On all compounds or preparations of which distilled spirits are a component part of chief value, not specially provided for in this Act, there shall be levied a duty of not less than that imposed upon distilled spirits.

SEC. 332. Cordials, liquors, arrack, absinthe, kirschwasser, ratafia, and other spirituous beverages or bitters of all kinds containing spirits, and not specially provided for in this Act, two dollars and fifty cents per proof gallon.

SEC. 333. No lower rate or amount of duty shall be levied, collected, and paid on brandy, spirits, and other spirituous beverages, than that fixed by law for the description of first proof; but it shall be increased in proportion for any greater strength than the strength of the first proof; and all imitations of brandy, or spirits, or wines, imported by any names whatever, shall be subject to the highest rate of duty provided for the genuine articles respectively intended to be represented, and in no case less than one dollar and fifty cents per gallon.

SEC. 334. Bay rum or bay water, whether distilled or compounded, of first proof, and in proportion for any greater strength than first proof, one dollar and fifty cents per gallon.

SEC. 335. Champagne and all other sparkling wines in bottles, containing each not more than one quart and more than one pint, eight dollars per dozen; containing not more than one pint each and more than one half pint, four dollars per dozen; containing one half pint or less, two dollars per dozen; in bottles or other vessels containing more than one quart each, in addition to eight dollars per dozen bottles, on the

quantity in excess of one quart, at the rate of two dollars and fifty cents per gallon.

SEC. 336. Still wines, including ginger wine or ginger cordial and vermouth, in casks, fifty cents per gallon; in bottles or jugs, per case of one dozen bottles or jugs containing each not more than one quart and more than one pint, or twenty-four bottles containing each not more than one pint, one dollar and sixty cents per case; and any excess beyond these quantities found in such bottles or jugs shall be subject to a duty of five cents per pint, or fraction thereof, but no separate or additional duty shall be assessed on the bottles or jugs; *provided*, that any wines, ginger cordial, or vermouth, imported, containing more than twenty-four per centum of alcohol, shall be forfeited to the United States; *and provided further*, that there shall be no constructive or other allowance for breakage, leakage, or damage on wines, liquors, cordials, or distilled spirits. Wines, cordials, brandy, or other spirituous liquors, imported in bottles or jugs, shall be packed in packages containing not less than one dozen bottles or jugs in each package; and all such bottles or jugs shall pay an additional duty of three cents for each bottle or jug, unless specially provided for in this Act.

SEC. 337. Ale, porter, and beer, in bottles or jugs, forty cents per gallon, but no separate or additional duty shall be assessed on the bottles or jugs; otherwise than in bottles or jugs, twenty cents per gallon.

SEC. 338. Malt extract, fluid, in casks, twenty cents per gallon; in bottles or jugs, forty cents; solid or condensed, forty per centum *ad valorem*.

SEC. 339. Cherry juice and prune juice, or prune wine and other fruit juice not specially provided for in this Act, containing not more than eighteen per centum of alcohol, sixty cents per gallon; if containing more than eighteen per centum of alcohol, two dollars and fifty cents per proof gallon.

SEC. 340. Ginger ale, ginger beer, lemonade, soda water, and other similar waters in plain green or colored molded or pressed glass bottles, containing each not more than three fourths of a pint, thirteen cents per dozen; containing more than three fourths of a pint each, and not more than one and one half pints, twenty-six cents per dozen; but no separate or additional duty shall be assessed on the bottles. If imported otherwise than in plain green or colored molded or pressed glass bottles, or in such bottles containing more than one and one half pints each, fifty cents per gallon, and in addition thereto, duties shall be collected on the bottles or coverings, at the rate which would be chargeable thereon if imported empty.

SEC. 341. All mineral waters, and all imitations of natural mineral waters, and all artificial mineral waters not specially provided for in this Act, in plain green or colored glass bottles, containing not more than one pint, sixteen cents per dozen bottles; if containing more than one pint, and not more than one quart, twenty-five cents per dozen bottles; but no separate duty shall be assessed upon the bottles. If imported otherwise than in plain green or colored glass bottles, or if imported in such bottles containing more than one quart, twenty cents per gallon, and in addition thereto, duty shall be collected upon the bottles or other covering, at the same rates that would be charged if imported empty or separately.

SWEET WINE BILL.

SECTION 42. That any producer of sweet wine, who is also a distiller, authorized to separate from fermented grape juice, under Internal Revenue laws, wine spirits, may use, free of tax, in the preparation of such sweet wines, under such regulations and after the filing of such notices and bonds, together with the keeping of such records and the rendition of such reports as to materials and products, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may prescribe, so much of such wine spirits so separated by him as may be necessary for the preservation of the saccharine matter contained therein; *provided*, that the wine spirits so used free of tax shall not be in excess of the amount required to introduce into such sweet wines an alcoholic strength equal to fourteen per centum of the volume of such wines after such use; *provided further*, that such wine containing after such fortification more than twenty-four per centum of alcohol, as defined by section three thousand two hundred and forty-nine of the Revised Statutes, shall be forfeited to the United States; *provided further*, that such use of wine spirits free from tax shall be confined to the months of August, September, October, November, December, January, February, March, and April of each year. The Commissioner of Internal Revenue in determining the liability of any distiller of fermented grape juice to assessment under section three thousand three hundred and nine of the Revised Statutes, is authorized to allow such distiller credit in his computation for the wine spirits used by him in preparing sweet wine under the provisions of this section.

SEC. 43. That the wine spirits mentioned in section forty-two of this Act is the product resulting from the distillation of fermented grape juice, and shall be held to include the product commonly known as grape brandy; and the pure sweet wine which may be fortified free of tax as provided in said section, is fermented grape juice only, and shall contain no other substance of any kind whatever introduced before, at the time of or after fermentation, and such sweet wine shall contain not less than four per centum of saccharine matter, which saccharine strength may be determined by testing with Balling's saccharometer or must scale such sweet wine after the evaporation of the spirits contained therein, and restoring the sample tested to original volume by addition of water.

SEC. 44. That any person who shall use wine spirits as defined by section forty-three of this Act, or other spirits on which the Internal Revenue tax has not been paid, otherwise than within the limitations set forth in section forty-three of this Act, and in accordance with the regulations made pursuant to this Act, shall be liable to a penalty of double the amount of the tax on the wine spirits or other spirits so unlawfully used. Whenever it is impracticable in any case to ascertain the quantity of wine spirits or other spirits that have been used in violation of this Act in mixtures with any wines, all alcohol contained in such unlawful mixtures of wine with wine spirits or other spirits in excess of ten per centum shall be held to be unlawfully used; *provided, however*, that if water has been added to such unlawful mixtures either before, at the time of, or after such unlawful use of wine spirits or other spirits, all the alcohol contained therein shall be considered to have been unlawfully used. In reference to alcoholic strength of wines and mixtures of wines

with spirits in this Act, the measurement is intended to be according to volume and not according to weight.

SEC. 45. That under such regulations and official supervision and upon the execution of such entries, and the giving of such bonds, bills of lading, and other security as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, any producer of pure sweet wine, as defined by this Act, may withdraw wine spirits from any special bonded warehouse free of tax, in original packages, in any quantity not less than eighty wine gallons, and may use so much of the same as may be required by him, under such regulations, and after the filing of such notices and bonds, and the keeping of such records, and the rendition of such reports as to the materials and products and the disposition of the same, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, in fortifying the sweet wine made by him and for no other purpose, in accordance with the limitations and provisions as to uses, amount to be used, and the period for using the same, set forth in section forty-two of this Act; and the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, is authorized, whenever he shall deem it necessary for the prevention of violations of this law, to prescribe that wine spirits withdrawn under this section shall not be used to fortify wines except at a certain distance prescribed by him from any distillery, rectifying house, winery, or other establishment used for producing or storing distilled spirits, or for making or storing wines other than wines which are so fortified, and that in the building in which such fortification of wines is practiced no wines or spirits other than those permitted by his regulation shall be stored. The use of wine spirits free of tax for the fortification of sweet wines under this Act shall be begun and completed at the vineyard of the wine grower where the grapes are crushed and the grape juice is expressed and fermented, such use to be under the immediate supervision of an officer of Internal Revenue, who shall make returns describing the kinds and qualities of wine so fortified, and shall affix such stamps and seals to the packages containing such wines as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury; and the Commissioner of Internal Revenue shall provide by regulations the time within which wines so fortified with the wine spirits so withdrawn may be subject to inspection, and for accounting for the use of such wine spirits, and for re-warehousing, or for payment of the tax on any portion of such wine spirits which remain not used in fortifying pure sweet wines.

SEC. 46. That wine spirits may be withdrawn from special bonded warehouses at the instance of any person desiring to use the same to fortify any wines in accordance with commercial demands of foreign markets, when such wines are intended for exportation, without the payment of tax on the amount of wine spirits used in such fortification, under such regulations, and after making such entries, and executing and filing with the Collector in the district from which the removal is to be made such bonds and bills of lading, and giving such other additional security to prevent the use of such wine spirits free of tax otherwise than in the fortification of wine intended for exportation and for the due exportation of the wines so fortified, as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury; and all of the provisions of law governing the exportation of distilled

spirits free of tax, so far as applicable, shall apply to the withdrawal and use of wine spirits and the exportation of the same in accordance with this section; and the Commissioner of Internal Revenue is authorized, subject to the approval of the Secretary of the Treasury, to prescribe that spirits intended for the fortification of wines under this section shall not be introduced into such wines except under the immediate supervision of an officer of Internal Revenue, who shall make returns describing the kinds and quantities of wines so fortified, and shall affix such stamps and seals to the packages containing such wines as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury. Whenever such wine spirits are withdrawn, as provided herein, for the fortification of wines intended for exportation by sea, they shall be introduced into such wines only after removal from storage and arrival alongside of the vessel which is to transport the same; and whenever transportation of such wines is to be effected by land carriage, the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe such regulations as to sealing packages and vehicles containing the same, and as to the supervision of transportation from the point of departure, which point shall be determined as the place from which such wine spirits may be introduced into such wines, to the point of destination as may be necessary to insure the due exportation of such fortified wines.

SEC. 47. That all provisions of law relating to the reimportation of any goods of domestic growth or manufacture which were originally liable to an Internal Revenue tax shall be, as far as applicable, enforced against any domestic wines sought to be reimported, and duty shall be levied and collected upon the same when reimported, as an original importation.

SEC. 48. That any person using wine spirits or other spirits which have not been tax paid, in fortifying wine otherwise than as provided for in this Act, shall be guilty of a misdemeanor, and shall, on conviction thereof, be punished for each offense by a fine of not more than two thousand dollars, and for every offense other than the first, also by imprisonment for not more than one year.

SEC. 49. That wine spirits used in fortifying wines may be recovered from such wine only on the premises of a duly authorized grape brandy distiller, and for the purpose of such recovery, wine so fortified may be received as material on the premises of such a distiller, on a special permit of the Collector of Internal Revenue in whose district the distillery is located; and the distiller will be held to pay the tax on a product from such wines as will include both the alcoholic strength therein by the fermentation of the grape juice and that obtained from the added distilled spirits.

REPORT OF CHARLES B. TURRILL, SECRETARY.

Read at the annual meeting, held June 9, 1890.

To the honorable Board of State Viticultural Commissioners:

GENTLEMEN: Custom, more than actual necessity, requires at this time a report from the Secretary of the Board. So established and smooth running has become the routine work of the Secretary's office, and so efficiently has it been managed by my predecessors, that upon assuming its duties a year ago I found but little to require change.

During the last year the correspondence addressed to the Commission has been fully up to that of previous years, as shown by the files of past correspondence, and has come from nearly all sections of California, as well as from different parts of our own country, from Europe, Mexico, Central America, and Australia. In all cases as full attention as possible has been given to all these various applications for information and advice, while foreign correspondents sending information have been properly thanked for the same.

The library of the Commission, which for completeness and the intrinsic merit and rarity of its volumes, is not only the most complete viticultural library in the State, but on this continent as well. During the year a number of additions have been made. Especially noteworthy among these is a set of reports of the Commissioner of Internal Revenue. The lack of funds has prevented the purchase of books, and only a few periodicals have been subscribed for.

The reports of the Commission have been sent to a large number of producers in various parts of the State who have applied for them. Complete sets of these reports have been sent to several libraries, scientific societies, etc., in different parts of the world, with the request that each send to this Commission such reports as they may have of their own publication. This method is already beginning to bear fruit, and has brought us reports of interest from Australia and elsewhere.

During the past year the Seventh Annual Viticultural Convention was held in the hall of the Commission, beginning August 13 and closing August 17, 1889. Much interest was shown in the proceedings in the afternoons and evenings, when papers were read by different viticulturists and freely discussed by those present. Two hundred and six samples of wines and brandies were exhibited at the Convention, and were carefully judged and reported upon by the committees. These reports, together with stenographic reports of the proceedings, are in the hands of your Secretary awaiting publication.

During the month of December, under invitation, there was conducted in a portion of the Viticultural Hall a most meritorious citrus exhibit by the producers of Placer County. Notwithstanding the inclement weather, thousands of visitors were attracted, all of whom also had an opportunity, which they improved, of inspecting the viticultural exhibit of the Commission.

Upon the invitation of the Commission, Major H. Gardner, Special Agent of the Eleventh Census of the United States, appointed to report upon the viticultural industries of the country, has had desk room in my office while in the city. I have rendered him all the assistance in my power in his work.

The Commission has received during the year the regular newspapers from various parts of the State, which have been kept on file. The thanks of the Commission are due to the publishers of these journals for their courtesy.

The series of scrapbooks started several years ago have been efficiently kept up by Mr. W. H. McNeil. These books, arranged by viticultural districts, and special subjects, are of great value, presenting, as they do, a current encyclopædic account of the development of the State from the regular issues of the press.

I would respectfully urge the advisability of compiling a new directory of grape growers and wine makers. The directory published in 1888 has served a good turn, but it is now becoming somewhat obsolete, owing to many changes and removals among those whose names are therein, and also because there are a large number of new names to be added to the list. The work of getting out such a directory is considerable, and much time will have to be taken to do the work carefully and efficiently, but it seems that the advantages of having such a book brought up to date will well compensate for the labor and expense of its preparation and publication.

This Commission was invited to send delegates to a preliminary meeting called to take action regarding a California exhibit at the Columbian Exposition, to be held in Chicago, Illinois, in 1893. The delegates from this Commission, who could be reached in the limited time given by the notice, attended and took part in the proceedings, the outcome of which has been the call for a State Convention, to be held in San Francisco on September eleventh next. This Commission is one of the bodies invited to send five delegates to that Convention.

In closing, I desire to report that all the work of the Secretary's office is fully in hand, and everything has been attended to in proper season.

Respectfully submitted.

CHARLES B. TURRILL,
Secretary.

MINUTES OF THE VITICULTURAL COMMISSIONERS.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
204 MONTGOMERY STREET, SAN FRANCISCO, March 10, 1888. }

A special meeting of the Board was called to order on the above date at 10 o'clock A. M., Arpad Haraszthy presiding. The following Commissioners were present—Haraszthy, Wetmore, West, DeTurk, Krug, and Manlove. The Secretary being necessarily absent, the Chief Executive Officer was requested to take his place. The minutes of the previous meeting were read and approved.

Mr. Haraszthy stated that he had been requested to extend to California vineyardists the invitation of the Australian Government to participate in the World's Exposition to be held at Melbourne during the present year.

Mr. West then presented the following resolution, which was seconded by Mr. Krug, and unanimously carried:

Resolved, That we do hereby appoint Mr. F. Pohndorff as agent of this Commission to proceed to London, Bordeaux, and Spain, to carry with him samples of California viticultural products with a view to determine the opportunities of trade with those places; also to procure samples and make collections of wines, raisins, cuttings, and other products of interest and value for our study, the actual expense of such work to be defrayed by this Commission not to exceed the sum of \$1,500; and be it further

Resolved, That we do hereby recommend to the honorable Commissioner of Agriculture for the United States the name of F. Pohndorff as an efficient agent for appointment by the Department of State at Washington as special agent to the International Conference at Madrid, to consider measures of importance concerning adulterations of the wine products of the world.

A special committee, consisting of Commissioners Manlove, Krug, and Wetmore, was appointed to instruct Mr. Pohndorff as to his duties in the respect referred to in the above resolution.

The Secretary was instructed to forward to Commissioner Colman a copy of the resolutions recommending Mr. Pohndorff for appointment to represent our interests at Madrid.

A communication was read from B. F. Clayton, of New York, to our Chief Executive Officer, asking for instructions regarding certain matters pertaining to viticulture, and our interests in New York. Respecting the above communication, Mr. Wetmore offered the following resolution, which was adopted:

Resolved, That this Commission do hereby appoint Mr. B. F. Clayton as local officer and agent of this Commission, to disseminate in the East information concerning our industry, and to carry out, so far as practicable, the policy of this Commission as instructed from time to time; to serve without compensation, and to report to this Board when convenient.

Resolved, That the Secretary be instructed to acknowledge gratefully the services of said B. F. Clayton performed in the past, and to notify him of the above appointment.

The following resolution was offered by Dr. Manlove, and was carried unanimously:

Resolved, That it is the sense of this Commission that so far as practicable and wise, all internal revenue taxes should be reduced or abolished, it being expressly understood,

however, that distinct principles, other than the collection of revenue solely, and in the interest of public morals, should govern the taxation of spirits; and,

Resolved, further, That there should be no reduction in the tax on spirits, except so far as grape brandy is needed for the preservation of pure sweet wines, and alcohol used in the arts.

Resolved, further, That it is of great importance that our delegation in Congress should consider also the wisdom of increasing the tax on spirits, and particularly such modifications of existing laws that may be necessary to encourage improvement in the quality of distilled liquors and the restriction of compounded and rectified goods, to this end the principle of indefinite bonding being capable of assisting in a practical reform.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, April 18, 1888. }

A special meeting of this Board was called to order at the above date at 11 o'clock A. M. by President Haraszthy. The following Commissioners were present: Haraszthy, Krug, Shorb, West, and DeTurk; also, Chief Executive Officer Wheeler and Secretary C. J. Wetmore.

The Secretary read the resignation of Arpad Haraszthy as President of the Commission. After careful consideration the resignation was not accepted by a unanimous vote.

A communication was received from Dr. Vanderbeck offering to take charge of an exhibit of wines at the Melbourne Exposition, and stating his terms for doing so. On motion, the offer was not accepted.

A communication was also read from Mr. E. J. Howell, a wine merchant of London, and special correspondent of the London "Globe," offering his services as special agent of the Commission. On motion of Mr. West, Mr. Howell was appointed a special agent of this Commission at London, to serve without compensation.

President Haraszthy then handed in his report to the Governor for the year 1887.

Chief Executive Officer Wheeler reported that the reports of the Commissioners for 1887 would be sent to the State Printer in a few days; also, that the manuscript of the last Convention had already been sent to the State Printer; also, that he was having some translations made of French authorities on wine making, which, when published, would be for free distribution.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, June 11, 1888. }

The regular semi-annual meeting of the State Viticultural Commission was held on the above date, Vice-President Wetmore in the chair.

The following Commissioners were present: Messrs. Wetmore, Krug, West, DeTurk, Shorb, Manlove, and Doyle; also, Chief Executive Officer Wheeler and Secretary C. J. Wetmore.

The minutes of the previous meeting were read and approved.

Vice-President Wetmore, from the Committee on Experimental Wine Cellar, reported that there was in the cellar a fine lot of wines selected from different parts of the State, and also some samples made by the Commission; that some of the wines were ready for bottling, and that they would not improve if left longer in the casks. The committee hoped that all the Commissioners would visit the cellar after the meeting adjourned.

The committee appointed to give instructions to Mr. Pohndorff, special agent of the Commission to attend the conference at Madrid, reported that so far they had not been able to do anything, owing to the fact that no word had been received from Washington, D. C., as to the time of holding the conference.

Chief Executive Officer Wheeler reported that the reports of the last Convention would soon be ready for distribution; also, that the report for 1887 of the Commissioners would soon be ready to be sent to the State Printer; also, that he had translated a treatise on wine making, by Ladrey, and that when published by the State Printer it would be for free distribution.

The Chief Executive Officer was instructed to confer with the Committee on Distillation, and prepare an essay on distillation, and to submit the same to the Board before publication.

The election of officers for the ensuing year then took place, resulting as follows: President, Charles A. Wetmore; Vice-President, I. DeTurk; Treasurer, Charles Krug; Secretary, Clarence J. Wetmore; Chief Executive Officer, J. H. Wheeler.

The following resolution, offered by Mr. Doyle, was adopted:

Resolved, That the Chief Executive Officer ascertain, and report to the Board, under what section of the Revised Statutes and department rulings cherry juice is admitted by the customs officers at a less rate of duty than distilled spirits, which form a component part of it of chief value.

Recess taken until 2 P. M.

On resuming business, Mr. Krug moved that the President appoint a standing Committee on Statistics, whose duty will be to supervise and direct the gathering of statistics in conjunction with the officers of the Commission.

The motion was carried, and the President appointed the following committee: Messrs. Krug, West, and Shorb.

President Wetmore then brought up the subject of a State Wine Exchange and Permanent Exhibit, and stated that he had given the matter considerable thought, and had sent out a prospectus to the members of the Commission after consulting with several members of the Board, and other wine growers. After explaining his ideas of such an exchange, and the manner in which he thought it should be run, Mr. Doyle offered the following resolution, which was unanimously adopted:

Resolved, That we approve of the suggestion of a Wine Exchange, to bring producers and buyers of viticultural products together and maintain a permanent exhibit of such products, and that a committee of three, of which the President shall be Chairman, be appointed to frame a detailed plan therefor, and report the same at the earliest opportunity.

The following is the committee appointed: President Wetmore, Shorb, and DeTurk.

The meeting then adjourned, to meet on the following day at 11 o'clock A. M.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, June 12, 1888. }

The adjourned meeting of yesterday was called to order on the above date at 11 o'clock A. M. The following Commissioners were present: Messrs. Wetmore, West, DeTurk, Doyle, Shorb, and Manlove.

President Wetmore, Chairman of the Committee on Permanent Exhibit and Viticultural Exchange, reported that the members of the committee had consulted together and had agreed upon the following:

First—A commodious store should be rented on the ground floor, and with a good cellar, in a favorable locality.

Second—Transfer of all the present offices of the Commission to such store after fitting up suitable rooms by proper partitions, etc., reserving the larger portion of such store for

(a) Permanent exhibit of wines, brandies, raisins, and other viticultural products of California, together with maps, photographs, and other illustrated attractions for the general public.

(b) Sampling department, where an opportunity will be given to purchase and sample any of the products offered by producers, and admitted in accordance with rules governing the same; exhibitors in this department will be credited with proceeds of products sold at their regular trade prices, and profits of retailing same to defray expenses as far as practicable, and all surplus profits to be paid into the State Treasury. Visitors in the department to be guided only by their own taste or desires, aided by the catalogue; all interference on the part of the management and service in guiding taste or selection to be strictly prohibited; the management not to be responsible for unsold samples, except reasonable care of same, which shall be subject at any time to withdrawal by exhibitor after paying any necessary expense incurred specially with respect to them; such exhibits shall be subject also to be returned to the exhibitors at any time in accordance with the rules of this department. Sampling is also provided for in this department of such experimental stock as is the property of the State from the experimental cellar, as may from time to time be determined. Prices for retailing samples to be as fair as practicable, but so fixed as not to come into unfair competition with the ordinary retail trade. All attempts to use this department for the purpose of undercutting fair trade prices to be discouraged by strict rules, but every encouragement in favor of good prices for superior goods to be afforded in order to stimulate the production and care of fine products.

(c) Viticultural Trade Exchange, wherein facilities for producers, brokers, tradesmen, and wholesale merchants, to meet and examine products by sample, will be afforded, subject to special rule.

(d) Cellar for storage and experimental work.

Third—Management. The Permanent Exhibit and sampling to be under the general direction of a special committee, and managed by an officer of the Board, with such assistance as may be found necessary. In case this work is added to the duties of the Secretary, an additional compensation to be allowed for the same.

Fourth—The Exchange Department. To be organized by the Executive Committee of this Board, with power to associate with them an Advisory Board of Control from outside the Commission, whose rules shall first be reported to the Commission for approval.

After considerable discussion on the above plan, the following resolution, offered by Mr. Doyle, was unanimously adopted:

Resolved, That a permanent exhibition of viticultural products of the State be established in connection with the offices of the Commission in San Francisco; that the plan, outlined by the special committee just reported, be approved, and that it be referred to the Executive Committee, to prepare and adapt the details of such plan, and to carry out the same; that the premises under the Mechanics' Institute building, on Post Street, are deemed suitable for the purpose, and the committee are authorized to rent the same (unless more suitable ones be found), and fit the same up for the offices of the Commission, the permanent exhibition of products aforesaid, and with the view to the establishment of a Viticultural Trade Exchange on the same premises.

The President then appointed the following standing committees:

Executive Committee.—DeTurk, West, and Manlove.

Auditing Committee.—Manlove.

Finance Committee.—Doyle, Rose, and Shorb.

Vine Pests and Diseases of the Vine.—DeTurk, West, and Manlove.

To Confer with the Board of Regents.—Doyle, West, and Krug.

Distillation, Counterfeits, and Adulteration.—Shorb, West, and Krug.

Evils Resulting from the Introduction of Foreign Fruit Juices, as at Present Allowed.—Doyle, West, and DeTurk.

Raisins and Table Grapes.—West, Rose, and Manlove.

Experimental Wine Cellar.—Wetmore, DeTurk, and Krug.

Mr. Shorb then moved that a committee of three, of which the President should be the Chairman, should be appointed to wait upon Miss Kate Field and see if she would accept the office of lecturer for the Eastern States on the subjects pertaining to the wine industry, and if she would accept, to make satisfactory arrangements with her.

The motion was carried, and the following committee was appointed: Wetmore, Shorb, and Doyle.

On motion of Mr. Shorb, the Executive Committee was instructed to draft a set of resolutions showing the appreciation of this Commission for the work done in the past for the viticultural industry of the State by Arpad Haraszthy, late President of the Commission.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, October 26, 1888. }

A special meeting of the Board was held on the above date, and called to order at 11 o'clock A. M. by President Wetmore. The following Commissioners were present: Messrs. Wetmore, Krug, and Manlove.

A. S. Hallidie, Commissioner to represent the State at the Paris Exposition, was present, and conferred with the members with reference to an exhibit of wines to be made at the Exposition. After discussing the subject, the Commissioners agreed to make a collection of wines and brandies, and forward them through Mr. Hallidie.

President Wetmore reported that at the last meeting of the Board the Executive Committee was instructed to take possession of the premises in the Mechanics' Institute building on Post Street, and fit the same up for a Permanent Exhibit and Viticultural Exchange. Since that meeting the Trustees of the Mechanics' Institute refused to rent the store for the purposes we wished it. He further reported that he had looked around for another place, and had secured Platt's Hall at a rental of \$350 per month, and that the hall would be turned over to us about December 1, 1888. The action of the President was indorsed by the Commissioners present.

A communication was received from Peter Klein, proprietor of the Occidental Restaurant, offering to lease a portion of the hall for a café, in which a first class lunch would be served, and only such wines and brandies as were furnished by the Commission from the exhibits, charging the prices fixed by the exhibitors, with a small additional service charge. The communication was referred to the Executive Committee, with power to act.

The Chief Executive Officer reported that Mr. Shorb had consulted with the officers of the Commission in reference to employing an expert to examine into the vine disease in Southern California; that they had agreed that something should be done by the Commission at once, and had engaged Mr. Ethelbert Dowlen at a salary of \$150 per month to examine the disease, and report on the same. On motion, the above action was indorsed.

Mr. Krug reported that wine making was about finished in his district; that white grapes had fermented well, but that they had had some difficulty in fermenting Zinfandels; also, that the wine made from Zinfandels was very light in color.

Dr. Manlove reported that the wine yield in his district was short; that a great many vineyardists had dried their wine grapes, and had received satisfactory prices for the dried product; and that unless good prices were offered for fresh grapes next year, nearly all of the wine grapes would be dried.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, December 12, 1888. }

The regular semi-annual meeting of the Board was held on the above date, and was called to order at 11 o'clock A. M. by President C. A. Wetmore.

The following Commissioners were present: Wetmore, Krug, West, DeTurk, Doyle, Shorb, and Manlove; also Chief Executive Officer Wheeler and Secretary Clarence J. Wetmore.

The minutes of the previous meeting were read and approved.

A communication was received from Miss Kate Field stating that she would soon deliver her first public lecture, and that the expense of the same would be about \$500. On motion of Commissioner Doyle, Miss Field was authorized to expend an amount not to exceed \$500 in the necessary expenses of a public lecture, to be delivered as soon as possible in some eastern city, in the advocacy of California wines. Miss Field also wrote that she had recently introduced Miss Mary Anderson to sound California wines, and that the charming actress was delighted to find that her native State produces so excellent and pure a beverage. She also inclosed letters from many noted persons in the East to show that her work for the Commission was well received.

In referring to the disease which is devastating the vineyards of Southern California, Mr. Shorb stated that Mr. Ethelbert Dowlen, the expert appointed by the Commission to investigate the disease, was working very hard and was studying the whole disease from a scientific standpoint, but that up to the present time he had not discovered the true cause of the disease, but that he was positive it had not been caused by any insect. Mr. Shorb further stated that thousands of acres were being destroyed by the disease, and if it was not checked that all the vineyards of the south were doomed. He also was of the opinion that the same disease had appeared in the northern part of the State, and advised the other Commissioners to be on the lookout for it. He

thought that the Commission should use every means in its power to find out the cause of the disease, and, if possible, to check it. He further stated that he had written a letter to Hon. Norman J. Colman, Commissioner of Agriculture at Washington, D. C., asking the assistance of his department in the erection of a conservatory where the disease could be studied during the winter, and also that he send an expert to work in conjunction with the expert employed by this Commission. In answer to this letter, Mr. Colman had stated that the department could not furnish any money for building the conservatory, but that next spring he would send out an expert to assist the Commission in its work. Mr. Shorb also stated that through instructions from the Executive Committee of this Board, he had built a small conservatory where the temperature could be regulated and the green leaves forced out on the vines, and so the disease could be studied during the winter.

The Commission then indorsed the work done by Mr. Shorb, and on motion of Mr. Doyle, Mr. Shorb was appointed a committee of one to continue the investigation of the disease, and to correspond further with the Department of Agriculture at Washington, stating the importance of the work, and that the department should send on the expert at once, so that the work can be carried on during the winter.

On motion of Mr. Krug, the Chief Executive Officer was instructed to prepare a circular describing the disease, and to send it out at once to all the vineyardists of the State, with the request that they keep a lookout for the disease, and to report it immediately to this office when discovered.

The Commissioners then took up the subject of the Permanent Exhibit in Platt's Hall, and after considerable discussion the details outlined in the circular sent out by the Secretary were adopted, and on motion of Mr. Shorb the Secretary was made General Manager, with a salary of \$150 per month, and to do the work of the Secretary without extra pay. The Executive Committee was instructed to carry out the plans as determined upon.

On motion of Mr. Krug, the following Committee on Legislation was appointed: Messrs. Doyle, Manlove, and West.

The President then stated that at the last meeting of the Board it was decided best to gather together representative samples of California wines and brandies, and send them as a State collection to the Paris Exposition, and he asked the Commissioners to take the matter in hand at once, and to forward samples from their districts to the Secretary, so that he may prepare them for shipment.

The Chief Executive Officer reported that he was making selections of dried Zinfandel grapes for the purpose of sending them to Paris and Bordeaux, in order to ascertain their value for wine-making purposes, and also to find out what sort of market there would be for large quantities of them.

Dr. Manlove stated that some dried wine grapes in his district had sold for 3 $\frac{3}{4}$ cents per pound by the carload, and also that the Chasselas and Burger made very fine dried grapes, and that the Zinfandel was one of the easiest to dry.

Mr. Krug reported that he was gathering statistics in his district, and would soon be able to hand in his report for 1888.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 SAN FRANCISCO, March 31, 1889. }

A special meeting of the Board was called by the President for the above date, to consider the resignation of the Chief Executive Officer, but there being no quorum present, the meeting adjourned to meet at the call of the President.

CLARENCE J. WETMORE,
 Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, {
 SAN FRANCISCO, April 20, 1889. }

A special meeting of the Board of State Viticultural Commissioners was held on the above date at its office in Platt's Hall, and was called to order at 11 o'clock by the President, Charles A. Wetmore.

The following Commissioners were present: Wetmore, Krug, West, DeTurk, Doyle, and Rose.

The minutes of the previous meeting were read and approved.

Mr. DeTurk, Chairman of the Executive Committee, reported that the work of the present officers had increased so much that the committee recommended that all of the offices be filled; also, that full power should be given to the Executive Committee to act in cases of urgency, so that there will not be a necessity of calling so many special meetings of the Board. Acting on this report, Mr. Rose offered the following resolution, which was unanimously adopted:

Resolved, That all matters of detail involved in the execution of the work laid out by this Board, and in conformity with the defined policy as expressed by resolutions and the laws governing the Commission, and all other business of the Commission during the intervals between meetings, not otherwise provided for by the Commission at its regular or special meetings, shall be under the control of the Executive Committee, with full power to act in the name of the Commission. Said committee shall keep in a book in the office full minutes of its proceedings, with records of the work authorized or undertaken, which shall be subject to any member of the Board, and be laid before the Board at its next ensuing regular or special meeting, accompanied, when necessary, by a detailed report. The Board shall, at any time, have authority to change the action of the committee from the time such change is declared.

Mr. Doyle then offered the following resolution, which was carried:

Resolved, That on the written request of any two members of the Board, the Secretary shall call a special meeting of the Board, to be held within ten days after presentation of such request, stating therein the objects of the meeting as expressed to him by the members requesting the call.

The work so far done by the Executive Committee in organizing the Permanent Exhibit and café was indorsed, and the committee was requested to make detailed report of the work done and to present it at the next meeting.

Mr. J. H. Wheeler, having informed the members that owing to private business requiring his constant service he would be compelled to resign the office of Chief Executive Officer, his resignation was accepted, to take effect May 1, 1889, and on motion of Mr. Doyle, the President, C. A. Wetmore, was elected Chief Executive Officer.

Owing to the increase of work devolving upon the Manager and Secretary, and acting on the recommendation of the Executive Committee, that all the offices should be filled, Mr. Rose moved that Mr. C. B. Tur-

rill, Manager of the Chamber of Commerce of San Diego, be appointed Secretary, and that Clarence J. Wetmore be retained as Manager of the Hall and Experimental Cellar, the Manager to receive the same salary as heretofore fixed. The motion was unanimously carried.

J. B. J. Portal, of San José, who is on his way to France to attend the Paris Exposition, was made a special agent of this Commission to inquire into the dried grape business; to find out the quantity used in that country, and the possibilities of a market for our dried wine grapes. The sum of \$200 was voted Mr. Portal to cover expenses in getting such information.

Mr. Krug moved, and the motion prevailed, that a State Convention be called as soon as possible, and that the time and arrangements be left with the Executive Committee.

On motion of Mr. West, the Executive Committee was requested, with the aid of the officers of the Board, to investigate the laws of different counties respecting the sale of fermented and distilled liquors, collecting the same, and showing the effect on public morals, and any amendments that should be made to make the same effective. Also, that the same committee should do all it could to find out the markets for dried wine grapes, and to coöperate with the Grape Growers and Wine Makers' Association in this work, and to lend them all the assistance possible.

The subject of a market for dried wine grapes was discussed freely, and was considered to be one of the most important works of the Commission for the ensuing year.

The Secretary was instructed to forward the thanks of this Commission to Miss Kate Field for her able lectures delivered in Washington, D. C., and Boston, and to send their greetings and well wishes.

The Commission then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, June 10, 1889. }

The regular semi-annual meeting of the Board of State Viticultural Commissioners was held at their office, in Platt's Hall, at 11 o'clock A. M.

Present: Commissioners Wetmore, West, Manlove, and Doyle.

There being no quorum present, the Board adjourned to Tuesday, June 11, 1889, at 11 o'clock A. M.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, June 11, 1889. }

The adjourned meeting of the Board of State Viticultural Commissioners was held at the office of the Commission, Platt's Hall, at 11 A. M.

Present: Commissioners Charles A. Wetmore, Isaac DeTurk, W. S. Manlove, John T. Doyle, George West, and L. J. Rose; also, General Manager C. J. Wetmore and Secretary C. B. Turrill. President Wetmore was in the chair.

The Secretary read the minutes of meetings held April 20, 1889, and June 10, 1889. By a unanimous vote these minutes were approved.

The minutes of a meeting of the Executive Committee, held June 10, 1889, were submitted and approved.

The next order of business was the election of officers for the ensuing year. The ballots being counted, the following result was announced: Charles A. Wetmore, President; Isaac DeTurk, Vice-President; Charles Krug, Treasurer; Charles B. Turrill, Secretary; Charles A. Wetmore, Chief Executive Officer.

It was moved by Commissioner West that the present appointed officers be continued in office, subject to the future action of the Executive Committee. The motion was seconded and carried.

Chief Executive Officer C. A. Wetmore reported progress in his department, and outlined a large amount of work which he wished to carry through. In his opinion, one of the most important things to be undertaken would be the preparation and publication of an original work on fermentation and distillation. He also thought it important to issue a work on hygiene, as related to the wine interest. He thought it would be a good thing to inaugurate a series of monthly lectures in the hall.

The report of J. H. Wheeler, late Chief Executive Officer,* was then read, discussed, and placed on file.

The report called up a general discussion of the disease. In the absence of Commissioner J. DeBarth Shorb, who had been appointed a special committee on the subject, Commissioner Rose described the manner of the spread of the disease, saying that it traveled with the wind, and that its effects were very sudden and fatal. He had noticed that different varieties of grapes were differently affected. Those whose fruit contained the largest amount of sugar were first to be attacked, and others in proportion, until the Zinfandel, having but a small proportion of sugar, resisted longest. His observations convinced him that the disease does not travel in the winter, but rather when the vines are in foliage. The vines die down from the top. He had noticed no vines exempt when surrounded by affected vines. The vineyards at Anaheim and Orange were practically destroyed, with but one small exception. The owner of this vineyard had treated his vines in some manner which he had not disclosed. Outside of the districts mentioned, about 10 per cent of the vineyards of Los Angeles County are destroyed. He had noticed no difference in the progress and effects of the disease, either on low land or on gravelly soil with good under-drainage. He thought a careful examination of the fungus found on the diseased vines in Los Angeles County, and of that supposed to be the same on vines in the northern part of the State, would disclose a difference.

Commissioner Wetmore suggested, in order to better compare the disease being studied by Mr. Dowlen under the supervision of Commissioner Shorb, and to identify it and to determine whether the same disease is prevalent in other parts of the State, that, in his opinion, it would be important to get Dr. H. W. Harkness, who is the best authority on fungoid growths in the State, to go to Los Angeles and report on the disease.

Commissioner Rose and the others present fully indorsed this plan, and as Mr. Wetmore stated that he would soon go to Los Angeles County

* This report will be found elsewhere in this volume.

to personally inspect the infected district, it was decided that Mr. Wetmore should endeavor to get Dr. Harkness to go with him.

President Wetmore submitted a letter from Kate Field detailing her work in the East. After discussion, the matter was referred to the Executive Committee.

President Wetmore then brought up the matter of a State Convention. After discussion the subject was left with the Executive Committee. In the discussion Mr. Wetmore stated that he thought that only matured wines (1887 and older) should be exhibited at the coming Convention, as at former Conventions new wines had been exhibited and tested, and now we should devote more attention to the matured wines. This view was fully indorsed.

Mr. DeTurk favored a good exhibit of grapes in the hall during the grape season, as well as during the time of the Convention.

Chief Executive Officer C. A. Wetmore suggested that experiments be made in the manufacture of sherries in the experimental cellar. This matter was referred by the Board to the Chief Executive Officer, and he was authorized to take such action as he thought proper.

On motion of Commissioner Rose, duly seconded and carried, the President and Commissioner Doyle were authorized to take all necessary action in regard to getting special duties fixed on cherry juice, so as to regulate importations.

There being no further business, the Board adjourned.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, June 12, 1889. }

Ordered by the President this day that all standing committees as at present constituted be continued, and that the members of the same are reappointed.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, }
SAN FRANCISCO, December 9, 1889. }

The regular semi-annual meeting of the Board of State Viticultural Commissioners was held at the office of the Commission, 216 Montgomery Street, San Francisco, on the above date.

Present: Commissioners C. A. Wetmore, Charles Krug, J. DeBarth Shorb, John T. Doyle, W. S. Manlove, and George West, and Chas. B. Turrill, Secretary of the Board. Commissioner I. DeTurk arrived during the reading of the minutes. President C. A. Wetmore was in the chair. On being called to order, owing to the fact that alterations were being made in the hall, the Board adjourned to the Occidental Hotel.

The Board reassembled in one of the reception rooms of the Occidental Hotel, Montgomery Street, San Francisco.

The minutes of the meetings held June 10 and June 11, 1889, were read and approved.

Commissioner J. T. Doyle made a verbal report on behalf of the committee appointed to take action in regard to getting special duties fixed on cherry juice. The recommendations made were later in the proceedings incorporated by Mr. Doyle in resolutions which he presented.

Commissioner J. DeBarth Shorb, as special committee on the Anaheim vine disease, reported the progress thus far made in endeavoring to ascertain the cause of the trouble and to find a remedy. Mr. Dowlen has from time to time reported to the Commission the progress of his work under Mr. Shorb's direction. Mr. Shorb stated that specimens of the diseased vines have been sent to the best experts in Europe, in the hope that they can give information, as it is feared that the complaint is mal-nero, a disease which has devastated the vineyards of Italy. Photographs of the disease, as it appears under the microscope, are being made for extensive circulation among the most noted savants of the Old World.

On motion of Commissioner George West, duly seconded, it was decided to vigorously continue to push the investigation of the disease in Southern California.

The Secretary then presented the following financial statement (made by the General Manager), which, upon motion, duly seconded, was received and placed on file:

The following will show the expenditures for the first four months of the forty-first fiscal year:

July.....	\$2,343 18
August.....	1,514 80
September.....	1,835 11
October.....	1,579 45
	\$7,272 54

Estimated expense for the remaining eight months of the year:

Rent.....	\$2,800 00
Salaries.....	4,400 00
Southern California vine disease.....	1,200 00
Kate Field.....	200 00
State Analyst.....	800 00
Gas and water.....	480 00
Coal.....	60 00
Commissioners' expenses.....	250 00
Express charges.....	125 00
Postage, stamps, and incidentals.....	200 00
	\$10,515 00

Making the expenses for the year as follows:

Amount expended from July to November.....	\$7,272 54
Amount estimated balance of year.....	10,515 00

Total.....\$17,787 54

The amount appropriated by the last Legislature for the two years beginning with July 1, 1890, was \$35,000, of which amount not more than \$17,500 can be used the first year. Unless some of the expenses can be cut down for the balance of the year, there will be a deficiency at the end of the year.

After the report had been discussed by the members of the Board, on motion of Commissioner J. T. Doyle, duly seconded, it was

Resolved, That the State Analyst and his assistant be notified that owing to the scarcity of funds, and the pressing demands of other parts of the work of the Commission, the regular appropriation made for their services would have to be discontinued, greatly to the regret of the Commission, at the end of the present month.

The Secretary then read the report of the General Manager of the Exhibition Hall and Experimental Cellar,* which, on motion, duly seconded, was received and placed on file.

Commissioner DeTurk stated that he would leave for Washington, D. C., in a few days, and offered to do anything he could for the Board while there.

The Board then took a recess to 2:30 p. m.

On re-assembling in the same place at 2:30 p. m., all were present who were present at the morning session.

President Wetmore read a letter from B. F. Clayton, of Washington, D. C., giving an account of the prospective outlook for legislation relating to California viticultural interests.

President Wetmore then submitted his report.†

After a full discussion of the report by all the members of the Board of Commissioners, John T. Doyle introduced the following resolutions:

Resolved, That in the judgment of this Board the Internal Revenue tax on distilled spirits should not be repealed, except as regards spirits used in the arts and fruit spirits used in the fortification of sweet wines and dry wines for exportation only.

Resolved, That no general reduction in the tax on distilled spirits intended for use as beverages should be permitted, except on fruit spirits and on them only, so far as may be necessary to equalize cost of production between grain and fruit spirits. The abolition of the tax on fruit brandies should be opposed as a measure dangerous in the extreme.

Resolved, That our Congressmen should be impressed with the truth that the market value of alcohol controls the average market value of all ordinary wines, because alcohol is the base of all imitations of wine.

Resolved, That the relief demanded by the sweet-wine producers should be granted, but strictly limited to the producers at the original place of fermentation, and to a stated quantity, not exceeding fourteen per cent of alcoholic strength; wines so fortified, and containing not to exceed twenty-four per cent of alcohol, and should not contain less than four per cent of saccharine matter; no use of saccharine matter other than the pure product of the grape to be recognized as legitimate, excepting pure crystallized cane sugar, and no spirits for fortification to be free from tax, excepting pure fruit spirits. Producers of pure wine who ferment their own products should be permitted to procure fruit spirits free of tax, out of bond, for fortification, subject to careful supervision of the Internal Revenue officers to prevent fraud.

Resolved, That in our opinion the advantage to be gained by the privilege to fortify sweet wines free from taxation would not compensate for the harm that would be done by violation of any one of the principles stated above, or by failure to enforce any of the limitations and restrictions mentioned.

Resolved, That in amending the tariff, provision should be made taxing "fruit juice not containing alcohol, distilled or otherwise," at whatever rate Congress thinks fit to impose, and providing that "fruit juices containing alcohol, and not classed as wines or brandies," shall be classed as alcoholic compounds, which they really are.

Resolved, That Section 3328 of the Internal Revenue Act shall be amended so as to read as follows: "No. 3328. On all beverages containing alcohol, designated or sold as wine, or as a substitute for wine, not made from grape juice and prepared in accordance with methods recognized as legitimate in standard published works on the subject, there shall be levied and collected," etc., as in the present section; "provided, that beverages made from the juice of fruits or berries, in accordance with approved methods, shall be exempt from tax if labeled or branded with the name of the fruit from which the same was made," etc.

Resolved, That the bonding period for brandy should be extended to five years.

Mr. Wetmore presented the following:

Resolved, That ample facilities under Internal Revenue regulations to prevent fraud should be given for the fortification of any kind of wine, for exportation only, free of tax, provision being made against reimportation of the same without paying tax.

The resolutions introduced by Messrs. Doyle and Wetmore were seconded and passed with but one dissenting voice.

Commissioner Shorb, in voting, explained that he differed from his colleagues only in one particular contained in the resolutions introduced

* This report will be found elsewhere.

† This report related to the proposed Sweet Wine bill, and will be found elsewhere.

by Mr. Doyle, viz.: if the Sweet Wine bill could not be passed without conceding the use of grain spirits as well as of fruit spirits free from tax for fortifying sweet wines, he would be willing to make this concession rather than lose the bill.

It was moved by Commissioner John T. Doyle, duly seconded and unanimously passed, that a committee of three be appointed to draft a letter to the Senators and Representatives of California in Congress, setting forth the legislation desired on the part of the Commission. The committee appointed consisted of Commissioners John T. Doyle, George West, and J. DeBarth Shorb.

There being no further business before the meeting, the Board adjourned.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS, {
SAN FRANCISCO, June 9, 1890. }

The regular annual meeting of the Board of State Viticultural Commissioners was held at the headquarters of the Commission, Platt's Hall, 216 Montgomery Street, San Francisco, at 10:30 A. M.

The following Commissioners were present: Isaac DeTurk, G. G. Blanchard, J. DeBarth Shorb, George West, John T. Doyle, Charles Bundschu, E. C. Priber, and R. D. Stephens.

Charles Bundschu took his seat, vice Charles A. Wetmore, for the San Francisco District.

E. C. Priber took his seat, vice Charles Krug, for the Napa District.

R. D. Stephens took his seat, vice Wm. S. Manlove, for the Sacramento District.

L. J. Rose was absent. G. G. Blanchard was not present at roll call, but came in at the part of the proceedings at which his arrival is mentioned in these minutes.

A quorum being present, the Board was called to order by Vice-President Isaac DeTurk, who presided during the meeting.

Secretary Charles B. Turrill, General Manager Clarence J. Wetmore, Chief Executive Officer Charles A. Wetmore, and representatives of the press were also present.

The meeting was called to order by Vice-President DeTurk at 10:30 A. M.

The Secretary read the minutes of the meeting of the Board, held December 9, 1889, except the report of Charles A. Wetmore therein, which, by unanimous consent, he was excused from reading. The minutes were approved as read.

The Secretary then read the report made by Ethelbert Dowlen, and submitted by Commissioner J. DeBarth Shorb, this report being numbered forty-two in the series of Mr. Dowlen's reports made to the Board.*

After the reading of the report, it was moved by John T. Doyle, that wherever in the report the word "California" appears, as applied as a name to the disease, the word "Anaheim" be substituted by the Secretary. The motion was seconded and carried. The report as amended

* This report will be found printed elsewhere.

was then, on motion of John T. Doyle, duly seconded, received, and ordered placed on file.

At this point of the proceedings, J. DeBarth Shorb asked the privilege of introducing Mr. C. Furley Oldham, of England, who has been visiting various points in California for the purpose of making arrangements looking to the further introduction of California wines in England. On motion of Mr. Shorb, duly seconded, it was unanimously resolved to suspend the regular order of business and listen to Mr. Oldham's account of his experience in introducing California wines into England.

Mr. Oldham thereupon made a very interesting address, explaining the difficulties he had met with and had overcome, in placing California wines on the English market. Among other things, he stated that while, as a rule, the English do not drink much white wine, he had found that the California white wines met with a hearty reception.

At the conclusion of Mr. Oldham's remarks, John T. Doyle moved that a vote of thanks be extended to Mr. Oldham for his very entertaining and instructive address. The motion was seconded and unanimously carried.

During Mr. Oldham's speech, Commissioner G. G. Blanchard arrived and took his seat.

On the resumption of the regular order of business, the Secretary read the report of the Manager of the Exhibit and Experimental Cellar.*

After the reading of the Manager's report, on motion of John T. Doyle, duly seconded, the report was received and ordered placed on file.

The Secretary then read his annual report.*

After the reading of the Secretary's report, it was moved by John T. Doyle that the report be received and ordered placed on file. Motion was seconded and carried.

The Secretary then read the financial report made by Clarence J. Wetmore, Manager. It is as follows:

RECEIPTS AND EXPENDITURES FOR THE THIRTY-NINTH AND FORTIETH FISCAL YEARS.
JULY 1, 1887, TO JUNE 30, 1889.

Receipts.

State appropriation.....	\$30,000 00
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Disbursements.

Salaries.....	\$5,438 74	
Experimental work.....	2,228 29	
Reports.....	445 62	
Traveling expenses Chief Executive Officer.....	225 19	
Commissioners' expenses.....	251 45	
Conventions.....	438 60	
Library.....	373 15	
Statistics.....	160 90	
Distributing information.....	298 50	
Experimental Cellar.....	1,251 38	
Office expenses.....	13,127 71	
State Analyst.....	2,427 40	
Lectures.....	3,057 50	
		29,724 43
Balance unexpended.....		\$275 57

Bill of E. C. Hughes, for \$135, not approved.

* This report will be found elsewhere.

FORTY-FIRST FISCAL YEAR.

Expenditures from July 1, 1889, to June 30, 1890.

July, 1889.....	\$2,343 18
August.....	1,514 80
September.....	1,835 11
October.....	1,579 45
November.....	1,203 31
December.....	1,442 65
January, 1890.....	1,213 25
February.....	1,548 15
March.....	1,191 35
April.....	1,215 48
	\$15,086 73

Estimated Expenditures for May and June.

Salary.....	\$1,100 00
Rent.....	700 00
Southern vine disease.....	450 00
Gas and water.....	80 00
Incidentals.....	200 00
	\$2,530 00
Expended.....	\$15,086 73
May and June (estimated).....	2,530 00
Total.....	\$17,616 73
Amount to be used.....	17,500 00
Deficiency.....	\$116 73

After the reading of the Manager's financial report, Chief Executive Officer Charles A. Wetmore stated to the Board that he had agreed that any deficiency for the forty-first fiscal year should be deducted from his salary as Chief Executive Officer. Therefore, on motion of John T. Doyle, the financial report was received and ordered placed on file. The motion was seconded and carried.

The Secretary then read the report of the Chief Executive Officer.*

After the reading of C. A. Wetmore's report it was moved, by John T. Doyle, that the report be received and ordered placed on file. It was carried.

On motion of J. DeBarth Shorb, duly seconded and carried, the Board hereupon took a recess until 2 P. M.

The Board reconvened at 2:10 P. M. Present: all the Commissioners who were present at the morning session: I. DeTurk was in the chair.

John T. Doyle moved to suspend the regular order of business and proceed to the election of officers of the Board. The motion was seconded and carried by a vote of four ayes and three noes.

The Chair announced that the first officer to be elected was President.

George West nominated I. DeTurk.

E. C. Priber nominated Charles Bundschu.

There being no other nominations, the members prepared their ballots, which were collected and counted. Seven ballots were cast, as follows: I. DeTurk, four; Charles Bundschu, two; J. DeBarth Shorb, one.

It was moved by E. C. Priber that the vote be made unanimous in favor of I. DeTurk for President. The motion was seconded and passed. The Secretary thereupon announced that I. DeTurk had been elected President of the Board.

*This report will be found printed elsewhere.

The Chair then announced that the election of Vice-President would be the next business in order.

John T. Doyle nominated J. DeBarth Shorb.

J. DeBarth Shorb withdrew in favor of George West.

There being no other nominations, the members prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: J. DeBarth Shorb, six; George West, two.

The Chair announced that J. DeBarth Shorb had been duly elected Vice-President of the Board.

The Chair then announced that the election of the Treasurer would be the next business in order.

George West nominated John T. Doyle.

Charles Bundschu nominated E. C. Priber.

There being no other nominations the members prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: John T. Doyle, six; E. C. Priber, two.

The Chair announced that John T. Doyle had been duly elected Treasurer of the Board.

The Chair then announced that the election of Secretary would be the next business in order.

John T. Doyle nominated Charles B. Turrill.

George West nominated Winfield Scott.

There being no other nominations the members present prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. B. Turrill, three; Winfield Scott, five.

The Chair announced that Winfield Scott had been duly elected Secretary of the Board.

The Chair then announced that the election of Chief Executive Officer would be the next business in order.

George West nominated Chas. A. Wetmore.

Chas. Bundschu nominated George Husmann.

R. D. Stephens nominated E. W. Maslin.

There being no other nominations, the members present prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. A. Wetmore, three; Geo. Husmann, two; E. W. Maslin, three.

The Chair announced that there had been no election on the first ballot.

Chas. Bundschu withdrew the name of George Husmann; the members then prepared their ballots, which were collected and counted. Eight ballots cast, as follows: C. A. Wetmore, four; E. W. Maslin, four.

The Chair announced that no choice had been made on the second vote. After speeches by R. D. Stephens, E. C. Priber, and John T. Doyle, supporting the two candidates, the members prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. A. Wetmore, four; E. W. Maslin, four.

The Chair announced that no choice had been made.

C. A. Wetmore asked the privilege of making a statement, which was granted. He stated that Mr. Maslin was already holding one State office, and could not legally hold another.

E. C. Priber moved that when the Board adjourn, it adjourn until tomorrow at 10 A. M., and that the Board then proceed to the election of a Chief Executive Officer. The motion was seconded. After discussion, Mr. Priber, with the consent of the second, withdrew his motion.

The Chair then announced that the fourth ballot would be taken. The members thereupon prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. A. Wetmore, three; E. W. Maslin, five.

The Chair then announced that E. W. Maslin had been duly elected Chief Executive Officer of the Board.

It was moved by John T. Doyle that the regular order of business be resumed. The motion was seconded and carried.

The Secretary read a number of letters from various parties.

John T. Doyle moved that the matters therein be referred to the Executive Committee. The motion was seconded and carried.

President Isaac DeTurk then announced the following committees:

Executive Committee.—George West, G. G. Blanchard, John T. Doyle.

Auditing Committee.—J. DeBarth Shorb,

Finance Committee.—L. J. Rose, J. DeBarth Shorb, John T. Doyle.

Committee on Vine Pests and Diseases of the Vine.—George West, E. C. Priber, J. DeBarth Shorb.

Committee on Distillation, Counterfeits, and Adulterations.—J. DeBarth Shorb, George West, Charles Bundschu.

Committee on Table Grapes.—George West, L. J. Rose, R. D. Stephens.

Committee on Experimental Wine Cellar.—George West, J. DeBarth Shorb, Charles Bundschu.

Committee on Anaheim Disease.—J. DeBarth Shorb.

Delegates to the World's Fair Convention, to be held September 11, 1890.—J. DeBarth Shorb, G. G. Blanchard, R. D. Stephens, Charles Bundschu, E. C. Priber.

J. DeBarth Shorb, George West, and John T. Doyle spoke regarding the investigation of the Anaheim disease, made by E. Dowlen. All of the speakers agreed that the work should be continued on the same plan thus far pursued.

John T. Doyle asked that the Executive Committee be instructed to secure the services of any other parties in the investigation of the Anaheim disease.

Under instructions from the President, the Secretary read that part of C. A. Wetmore's report which referred to asking the California delegation in Congress to pass the pending bill "authorizing the several States to control the sale of fermented and alcoholic drinks free from all interference on the part of the National Government."

George West asked Mr. Wetmore to make a statement regarding the matter. This Mr. Wetmore did.

It was moved by Mr. Doyle that it is the sense of the Board of State Viticultural Commissioners that all matters relating to the control of the sale of intoxicating liquors should be left to the several States. The motion was seconded by J. DeBarth Shorb, and carried.

The President was requested to notify the members of Congress from California of this action of the Board.

There was some discussion as to the action to be taken provided that E. W. Maslin should decline to serve as Chief Executive Officer, but no definite action was taken.

There being no further business, the Board adjourned.

CHARLES B. TURRILL,
Secretary.

APPENDIX.

RESISTANT VINES BEST SUITED TO CALCAREOUS (LIMEY) AND MARLY SOILS.

Report of Professor Pierre Viala to the Minister of Agriculture at Montpellier, on his recent viticultural mission to America. Translated from the French.

DEAR SIR: By resolution of March 1, 1887, you have done me the honor to intrust me with a mission to the United States of America. The object of this mission was to search for varieties of vines which would thrive in calcareous or marly soils.

This mission has been rendered necessary by the failure of the attempts to utilize the actually known American vines, either as grafting stock, or as direct producers in the chalky soils, which cover a large area of the vine-growing district in Southern France, and particularly in the departments of the Charente; the possible outcome, however, of this mission appeared, and it must be added, with good reason, to be very doubtful.

I will not enter, dear sir, into the details of the difficulties which I had to overcome during my researches in the United States, beginning with June 5th, and ending December 3, 1887. I will only recapitulate in this memoir the conclusion which I have drawn from my observations relating to the special object of the mission with which you have intrusted me, in order that the viticulturists shall be informed without delay about this matter. The numerous facts on which the following results (conclusions) are based, shall be brought forward in a report which is to follow, together with other viticultural studies which I have made in the United States—diseases of the vine, cultivation, vinification, economic and commercial questions, etc.

The first information which I obtained at Washington from the Department of Agriculture and from the United States Geological Survey did not give me much hope that I should find vines that would thrive in soils of a mainly calcareous character. Not only the geographical distribution of the native species was very little known, but it was also an established fact that in the United States there was an immense area, the greater part of which belongs to the cretaceous formation, which does not contain any chalk soils, similar to those of the Departments of the Charente and of the Champagne. Of the magnitude of the above mentioned area, an idea can be formed when we state that it stretches from Montana to the south of Texas; from the Rocky Mountains to the Mississippi, and comprises partly the States of Tennessee and Pennsylvania. As far as the marly soils are concerned, it is possible they have been formed by the decomposition of rocks which belong to the various geological formations, and that they are distributed quite irregularly over the whole area of the United States. Here I must state that during the six months which I have spent in the United States, I was able to take a survey but of a very small part of this country.

First of all it was necessary to find calcareous soils, which had to be, if not identical, at least similar to the calcareous and marly soils of France; further, to find native wild vines, which show a vigorous growth

in such soils. It was also necessary that these vines should be able to resist the attacks of the phylloxera, that they should take the graft, and last, not least, that they could be multiplied by cuttings. Finally, it was desirable that these species or varieties should be already existing in France, in order to avoid costly importations of the same; besides, being sent out on a scientific mission, I cannot overlook this side of the question.

During the first period of my mission I have explored various regions of the States of New Jersey, Maryland, Virginia, North Carolina, New York, and Ohio. The species which grow wild in these States, as well as in all the States of the North and East, are: *V. riparia*, *V. æstivalis*, *V. labrusca*, and *V. rotundifolia*. This last mentioned species, which grows only in the sandy and moist soils of the Atlantic Coast, is of no value whatever; it has been known already a long time in France.

The *V. labrusca* (Linne) has never been found in good condition, except when in sandy soils, rich loams, or red fertile soils. In poor soils, for instance, yellow marls, it is destroyed in the long run by the phylloxera. This applies particularly to States of the North and of the East, where the frosts are severe during winter and spring. In the Southern States also it succumbs quickly to the attacks of the insect, even in tolerably rich soils. The same can be said of the varieties directly derived from the *V. labrusca*.

The wild *V. æstivalis* (*V. æstivalis* of Michaux and *V. bicolor* of Le Conte) thrives only in sandy or rich loams, also in red soils, which are rich and mellow. As soon as the soil is marly, clayey, calcareous, and dry, this vine shows little vigor, although its roots are not injured by the phylloxera.

The *V. riparia* (Michaux) is the most common species in the region between Canada and the frontier of the Indian Territory. Few specimens only of this vine are met with on the banks of rivers in the south of Texas. These species, when growing wild, reaches its full development when growing in the United States only in very rich soils. In red soils and in alluvial loams, the varieties, with cordated (heart-shaped) thick and glossy leaves, are thriving remarkably well, but the trunk, though stout enough, has never the thickness of the southern varieties. It is by studying the soils in which the numerous varieties (simple or complex) of the *V. riparia* naturally grow, that one becomes convinced that they can be of real value only when growing in rich soils. I have never noticed this hardy species in marly or white and dry calcareous soils. Only once I have seen growing the *V. riparia* in a calcareous soil; this was on Kellys Island, which is one of the isles of Lake Erie; but was not a strictly calcareous soil. It was in the fissures of the compact Devonian limestone, where rich alluvial earth had accumulated, that I noticed the *V. riparia*. When calcareous fragments were predominating, the vines were chlorotic; the same remark could be applied to the vines that are growing in the yellow marls of Sandusky. I have often noticed in the woods specimens of *V. riparia*, whose leaves were covered with phylloxera galls, and whose roots were infested by numerous phylloxera; but I have never seen a case of death of a vine belonging to this species, which was due directly to this insect. Not one of the varieties of the North and the East has therefore a value for the "calcareous and marly soils."

During the second period of my voyage in the United States, I trav-

cled over Tennessee, Missouri, Indian Territory, and California. Some important observations had been made in Tennessee and Missouri, but it was necessary to combine them in Texas.

The *V. rubra* (Michaux) or *V. palaraat* which is met with only in isolated spots, in the sandy and black loams of the Merrimac and of the Mississippi (twenty miles north of St. Louis) and in Illinois, seems to be without any value as grafting stock, because it grows only in these very rich soils. Southwest of the Missouri and northeast of the Indian Territory I have observed the *V. rupestris* and its various hybrids, *Cordifolia rupestris*, *Riparia rupestris*; also the *V. linccumii*. The *V. linccumii* of Buckley (sometimes called *post oak*, or large-grained *æstivalis*) can have, through certain of its varieties, some value in the central regions of the United States, where particularly the black rot, the mildew, and severe frosts, have always rendered impossible, not only the successful raising of the European vines grafted on resistant stock, but also of certain American varieties.

It is my belief that the varieties of the *V. linccumii* have no future whatever for any of the vine-growing districts of our country; their small productions compared with that of our vines, the harsh and unsavory taste of their berries, which are above the middle size but rather devoid of juice, justify this belief. Besides all that, this species grows only in rich or sandy soils, never in white calcareous, or yellow marly soils; this applies to Missouri as well as to Arkansas, the Indian Territory, and Texas. On the banks of rivers, and in the black soils of the prairies, as well as in the pebbly and siliceous soils of the rich hills of the Indian Territory, individuals of this species attain a fine development at the trunk.

The *V. rupestris* (Scheele), which begins to meet the botanist's notice only in Tennessee and west of the Missouri, occurs further towards the south in the Indian Territory and in Texas; there, also, numerous derived varieties are to be found. It grows generally in river beds, which are dry after springtime, where no arborescent vegetation exists. The bottom of these ravines consists of a siliceous conglomerate, or of hard limestone, mixed with some alluvium; these constituents form together a dry and rather poor soil. The *V. rupestris*, however, thrives tolerably well in such soils. The trunk, which is sometimes very thick, is always better developed than that of the *Riparias*, which grow in alluvial soils; its branches are deprived of their leaves at base and creep on the soil. It is in the same soils that the hybrids of this latter species grow, *Cordifolia rupestris*, *Riparia rupestris*, which were first observed and imported into France by Mr. Taeger.

These hybrids are as hardy or even hardier than *V. rupestris* and *V. riparia*. They grow sometimes in the cavities of calcareous rocks (Devonian or Jurassic), which hold only small quantities of alluvial earth. All these varieties may prove very valuable as grafting stock in certain poor soils, but I do not think they are adapted for chalky soils, for I have not noticed them in such soils. There is still another proof for this assertion. Whenever the ravines in which generally the *V. rupestris* and its hybrids are found have a bottom of friable limestone, these vines disappear.

The varieties of vines which are peculiar to Texas grow exclusively in cretaceous limestone. The cretaceous region occupies the north of Texas, from the Panhandle to the Rio Pecos in the south, and from New Mexico in the west, eastwards, where it is limited by a line which unites Sher-

man, Dallas, Austin, and San Antonio; there it joins the Rio Pecos, following the latitude of San Antonio. With the exception of some small areas which belong to other formations (Carboniferous, Silurian, and Cambrian) this whole territory belongs by its fossils to the cretaceous formation, which reaches besides far into New Mexico, Colorado, and Arizona, States which I had no opportunity to visit, and where interesting observations could have been made.

The surface soil of the great plains (prairies) has generally everywhere almost the same composition; it is a black earth of an extreme fertility. The subsoil is a white calcareous rock; this rock is fissured and possesses variable hardness, but is always soft and has in many instances a texture which is intermediate between tufa chalk and the chalk which is peculiar to the Champagne. This subsoil is more or less deep (as deep as five feet), but it often crops out on the surface, where it disintegrates rapidly and forms a white earth, which contains an admixture of small chalky stones and a small amount of humus. The soil which results from such a mixture, is not so rich as that of the departments of the Charente.

The above described cropping out of the subsoil occurs sometimes without interruption over large areas, particularly on the sides of hills which are higher than four hundred or five hundred feet. The great table lands, which form the summits of these hills, have a richer soil; there the limestone is mixed with a reddish earth and numerous flinty pebbles, which often occur in nodules in the cretaceous formations of the subsoil.

It is in these soils that grow: *V. berlandieri* of Planchon, *V. cinerea* of Engelmann, *V. cordifolia* of Michaux, *V. candicans* of Engelmann, *V. monticola* of Buckley, a new variety which has been considered a species by Mr. T. V. Munson, the *V. Novo-Mexicana*, and numerous hybrids which result from the very various crossings between these species.

The *V. Novo-Mexicana* (T. V. Munson), which was observed for the first time in 1847, in New Mexico, by A. Fendler (herbarium of Cambridge), reminds one much of certain varieties of the *V. riparia*, and particularly of the *Solonis*. It occurs, according to Mr. T. V. Munson, in the part of Texas (Panhandle) which lies between New Mexico and the Indian Territory. I have observed but few plants of this species on the banks of the Red River. This vine grows in the soils of the cretaceous formation, but only in spots where black earth has accumulated, or in the alluviums of the banks of the great rivers; it is also in these soils that Mr. T. V. Munson has first found it growing. It will be perhaps of some value, on account of its luxuriant growth, as grafting stock; perhaps in this regard it will not be inferior to *Cordifolia rupestris*, *Riparia rupestris*, * * * in rich soils, but I do not think that it is fit for yellow marly or white calcareous soils. The same applies to the series of hybrids called *Champins*: they may result from the crossing of *V. rupestris* and *V. candicans*, or *V. rupestris* and *V. monticola* (Buckley).

I have observed the first mentioned varieties (*Rupestris* by *Candicans*) in Johnson County, in the beds of ravines, which are few miles west of Cleburne. They were growing in a soil which consisted of calcareous pebbles, with an admixture of a considerable quantity of rich alluvial earth.

The *Champins*, which result from the crossing of *V. monticola* and *V. rupestris*, and which are very hardy, grow in the same kind of soils as

the species I am going to mention now. The *V. monticola* of Buckley, (herbariums of Philadelphia, Washington, New York, Cambridge), which is nothing else but the *V. Montana* of the same author, or *V. Texana* of Mr. T. V. Munson, or *V. Foexiana* of Mr. S. E. Planchon, occupies only a very limited region in the southwest of Texas. It was observed by Buckley in Bell, Burnett, and Hays Counties; Mr. T. V. Munson has recently found it again in Bell and Lampasas Counties; it is asserted that it occurs also in Uvalde County, which is in the extreme southwest. I have noticed it in Lampasas and Bell Counties. The *V. monticola* (Buckley), which is very well characterized and quite different from *V. berlandieri* of Mr. Planchon, reminds one of some *Rupestris* varieties of rampant habitus. It is not common in the few counties where it exists, and its trunk and branches attain but a very feeble development. It is met with only on the table lands, where it grows in soils consisting of limestone fragments and numerous flinty pebbles, mixed with blackish or reddish earth. This species, it seems to me, has very little value as grafting stock for calcareous soils, on account of its feeble growth in the comparatively rich soils in which it occurs; as a direct producer it has no value whatever, notwithstanding its rather large pale rosy berries.

The geographical area of the *V. candicans*, or *Mustang*, comprises the whole south of the Indian Territory from the Arkansas River, and extends across the whole of Texas into Mexico. The *Mustang*, the hardiest of the vines which is to be found in the United States, does not thrive very well but on banks of rivers (Red River, Trinity River, Brazos River, and Rio Grande). Less frequently it occurs on cretaceous hillocks, but there, and in blue, very calcareous marl, it does not thrive as well as on the banks of rivers. It seems to me, altogether, that the *Mustang* variety is of less value for calcareous and marly soils than the three following species, on account of the difficulty in rooting the cuttings, even though special processes be used; still, it behaves well as grafting stock, and resists well the attacks of the phylloxera.

The three and only species which, by their actual behavior in their native soils, make me believe that they would do well in "calcareous and marly soils," are: the *V. berlandieri* (Planchon), the *V. cinerea* (Engelmann), the *V. cordifolia* (Michaux). I had already observed the *V. cordifolia* and the *V. cinerea* (sometimes called *Wichita*) in the argillaceous, or white marly soils (crawfish soils), which have been formed by the decomposition of rocks belonging to the Silurian and Devonian periods; these observations were made in Tennessee (Pleasant View and Ashland, in Cheatham County), and in the State of Missouri (near the village of Peocly, Pleasant Valley, on the western boundary of Jefferson County). These two species, which are common in the Eastern Central United States, are not to be met with beyond the Brazos River, which forms the southern limit of their occurrence in Texas. In the States of the East their trunks and branches grow much larger than is the case with *Riparias*; this applies particularly to the rich and deep sandy loams of the Mississippi, but they remain green and hardy in the poor and dry soils of Texas, where the soil and the subsoil consist of the white, brittle limestone, which we have mentioned already.

The *V. berlandieri* (Planchon), which by no means should be confounded with the *V. monticola* of Buckley, begins to make its appearance with few specimens only in the county of Johnson. This is the

species which, together with the *Mustang*, I have observed to be the most common in the whole of Texas south of the Brazos River, and far into Mexico; this means in a dry region where *V. cinerea* and *V. cordifolia* do not exist any more. The *V. Berlandieri* predominates in regions, the soil and subsoil of which are formed by the decomposition of cretaceous rocks, on which only some few rare plants grow and remain green, such as: *Melia azedarach*, live oak, *Quercus virens*, *smilax*, *Juniperus Virginiana*, etc.

V. berlandieri grows more vigorously in rich soils, just as the *Cordifolia* and the *Cinerea* do, but the first mentioned vine does not turn yellow in calcareous soils. In other respects, also, it can be compared to these two species, for it not only resists very well the phylloxera, but stands also very well grafting when it grows in chalky soils. I have seen very conclusive examples of this fact at Belton, where some Spanish vines, which had been grafted two years ago on four years old *Berlandieri*, were perfectly green and vigorous in these poor soils.

The *V. cinerea* and the *V. cordifolia* of the calcareous soils are particularly abundant in the region which comprises the counties, Collin, Dallas, Ellis, Hill, Tarrant, Parker, Johnson, and particularly in the neighborhood of the towns, Dallas, Fort Worth, Waxabachie, McKinney. The *V. berlandieri*, of the same geological formation, is particularly common in the counties, Bell, Williamson, Travis, Hays, Comall, and above all, in the neighborhood of the towns, Belton, Temple, Austin San Elmo, New Braunfels.

The varieties of the *V. berlandieri* and of *V. cordifolia*, which are met with on calcareous soils, possess as a rather special characteristic feature thick, cartilaginous leaves, the inner side of which has a golden yellowish green color. The *V. cinerea* has on the same soils less cordated and shorter, but more cartilaginous leaves, which besides have stiffer bristles. The hybrids between these three species, or between them and other varieties, appear to me to be of quality inferior to the original species, and I have observed them mostly in rather rich soils simultaneously with certain new varieties, which I do not think worth while to mention, on account of their inferiority.

Two more species had to be studied in their native soils, the *V. Californica* (Bentham) and the *V. Arizonica* (Engelmann).

The occurrence of the *V. Arizonica* is limited to the States of New Mexico and Arizona, which I had no opportunity to visit. The few attempts which were made in the vineyards of Northern California to replace by this species non-resistant stock, and which I have seen, impress me with the opinion that its qualities are to be compared with those of *V. rupestris*, as far as the question of adaptation is concerned.

As to *V. Californica*, whose vigorous growth and thick trunk are equaled only by the *Mustang*, I had an opportunity to study the same in the ravines (cañons) of the southern part of Los Angeles County. This vine grows only in rich and moist soils; it shows little vigor, and becomes chlorotic in poor and dry soils. The *V. Californica* would not offer much resistance to the phylloxera, as I was able to ascertain by several facts which I had observed in Napa County; in the southern California, which the phylloxera has not yet invaded, I have never noticed the insect on the leaves or roots of the *Californica*. I do not believe that the *V. Californica* will be of any importance for the vineyards of France. Besides, the majority of the California viticulturists,

who follow the processes which are used in our southern vineyards, restore their plantations, if the soil is rich, almost exclusively with varieties of the *V. riparia*.

From all this it is evident that only the vines which I have observed on calcareous soils can be of value as grafting stock. It has been always the great endeavor of the viticulturists of the East and Northwest to produce new varieties which would resist the black rot and the mildew. The severe frosts of the winter did not allow them to use anything but the varieties of *V. labrusca*, which are adapted for these regions, to which vine growing was limited to for a long time.

The California viticulturists, who were more favored by the climate, have (it must be mentioned here) never introduced into their country the direct producers from the East, but employ the French varieties. These reasons, combined with the habit of the eastern people to prefer foxy or sweetened wines, make them accept every day with great expectations each direct producer which is thrown on the market by the nurserymen, who try to improve the original varieties of *Labrusca*, either by crossing it with other varieties, or by seedlings. The fame, which certain of these new vines have acquired in the United States, has been often the unfortunate reasons for their introduction (adoption) by French vine growers.

Without entering into long details concerning these new direct producers, I believe it is my duty to say that the Niagara and the Empire State are varieties with white foxy berries, and inferior in quality to the Noah, which is already known in France. The Secretary loses almost all its fruit under the influence of black rot, and is badly affected by the phylloxera. The Montefiore has no more value than the Clinton, of which it is the parent; without value for our viticultural districts are also the varieties Duchess, Prentiss, Bacchus, Beauty, etc. The Yoakum and the McKee are nothing else but the Herbemont; the Robinson Seedling nothing but the Rulander. The Ironclad, which is far from being absolutely proof against the ravages of the black rot, is not as prolific a bearer as the European varieties, and yields an inferior and foxy wine. The Othello exists in the United States only in the collections of amateurs, and is not appreciated because the black rot, the mildew, and the drying up of the leaves in summer make its cultivation impossible; the same can be said of the Triumph. The Canada, Brant, Black Defiance, etc., are considered in the United States to be of little importance.

After my return from the United States, I remain still more convinced that we must particularly rely on the American grafting stock, in combination with our native species, in order to secure the restoring of our vineyards and to keep up the well deserved reputation of the French wines.

In summing up my statements, in order to bring forward clearly the practical facts which result from the preceding indications, I will say that for "calcareous and marly soils" the *V. berlandieri*, the *V. cinerea*, the *V. cordifolia* represent the grafting stock which offers the best chance for success.

These conclusions are based solely on the study of the soils in which wines grow in the United States. Still it could be that the facts which I bring forward would not stand the test of practical application in France, but I do not think so.

It could also be that other varieties, such as *V. Novo-Mexicana*, *Cordifolia rupestris*, *Hybrids champins*, would have some value in cretaceous

soils, as the elasticity of certain species, as far as the adaptation to certain soils is concerned, is well known, but I do not believe this either.

The *V. berlandieri*, the *V. cinerea*, the *V. cordifolia*, have, however, one fault: The cuttings from the typical species root only with difficulty, when they are multiplied by the ordinary processes. But, besides that, among the numerous varieties of this species certain varieties may exist which root easily. It will be possible, I believe, to multiply them by adopting methods which are already used in France and quite common in America; I refer to rooting the single eyes under glass, a process which is not expensive.

I would have certainly preferred to find vines which root easily, but not one of the species which possesses this quality remain green and vigorous in chalky soils.

Such are the principal facts which I have observed in the United States. Everywhere the Americans have facilitated my studies with a devotion which is above all praise, and I am sorry that at present I am not able to mention all those who have helped me. I cannot finish, however, this note without thanking Mr. T. V. Munson, Mr. Hermann Taeger, Messrs. Bush and Meisener. The impartial advice of Mr. Taeger has partly allowed me to solve the majority of questions on which I have reported to you, and I am happy to say they have agreed with my conclusions in the presence of facts, even if these facts should be contrary to their commercial interests. Last, not least, the Department of Agriculture and the United States Geological Survey at Washington have furnished me with valuable information, which greatly helped me to accomplish my task.

Mr. N. J. Colman, Commissioner of Agriculture of the United States, was not satisfied to put at my disposition everything which could advance my researches, but he delegated Mr. L. F. Scribner, Director of the Section for Vegetable Pathologic, to accompany me in all my explorations. Mr. L. F. Scribner has followed me constantly, and, although my studies were only of secondary interest to him, his devotion and help have not left me for a moment. It is not in my power to express how I appreciate this sign of benevolence which was shown to the French delegate by Mr. N. J. Colman and Mr. L. F. Scribner, and I can only express here my deep thankfulness.

Accept, dear sir, the expression of my entire devotion.

PIERRE VIALA,

Professor of Viticulture at the National School of Agriculture, Montpellier.

PARIS, December 17, 1887.

HOW TO DESTROY THE CALIFORNIA GRAPEVINE HOPPER.

The description of this insect and its habits are taken from "Harris' Insects Injurious to Vegetation," page 227, which reads as follows:

"The vine hoppers, as they may be called, inhabit the foreign and the native grapevines on the under surface of the leaves, on which they may be found during the greater part of the summer; for they pass through all their changes on the vines. They make their first appearance on the leaves in June, when they are very small, and not provided with wings, being then in the larva state. During the most of the time they remain perfectly quiet with their beaks thrust into the leaves, from which they derive their nourishment by suction. If disturbed, however, they leap from one leaf to another with great agility. As they increase in size, they have occasion frequently to change their skins, and great numbers of their empty cast skins, of a white color, will be found throughout the summer, adhering to the under sides of the leaves and upon the ground beneath the vines.

"When arrived at maturity, which generally occurs during the month of August, they are still more agile than before, making use of their delicate wings as well as their legs in their motion from place to place; and when the leaves are agitated, they leap and fly from them in swarms, but soon alight and begin again their destructive operations. The infested leaves at length become yellow, sickly, and prematurely dry, and give to the vine at midsummer the aspect it naturally assumes on the approach of winter. But this is not the only injury arising from the exhausting punctures of the vine hoppers. In consequence of the interruption of the important functions of the leaves, the plant itself languishes, the stem does not increase in size, very little new wood is formed, or, in the language of the gardeners, the canes do not ripen well; the fruit is stunted and mildews, and if the evil is allowed to go on unchecked, in a few years the vines become exhausted, barren, and worthless. In the autumn, the vine hoppers desert the vines, and retire for shelter during the coming winter beneath fallen leaves, and among the decayed tufts and roots of grass, where they remain till the following spring, when they emerge from their winter quarters, and in due time deposit their eggs upon the leaves of the vines, and then perish."

As observed in California, the hopper makes its appearance much earlier, and has been seen on the vines with the first warm weather of April. It continues its depredations even up to October, and has been observed infesting the rubbish of some vineyards all winter long. The most injury is done by them in defoliating the plant, thereby subjecting the grapes to sunburn and causing their failure to ripen. Their first appearance in spring is usually on the outside rows of the vineyard, particularly on those rows bordering grassy plots or uncultivated fields; from these they spread in a few weeks to the other portions of the field vineyard. With a knowledge of this fact the vineyardists may often head them off from a greater part of the vineyard by treating the first infested vines at an early date.

The ordinary operations of spring vineyard work, viz.: plowing, cultivating, and clod-mashing, destroy the eggs and larvæ of the insects, which are found on rubbish and leaves of the previous year, but they may still be looked for coming from the surrounding fields if such there are about. Burning the adjoining fields would prove a valuable auxiliary to their destruction.

THE REMEDY.

Little difficulty has been experienced of late in destroying insects which prey directly upon the foliage of the plant. A resort to poison, where it may be had, has usually proved satisfactory. The subject of this treatise, however, is much more difficult to eradicate, in that it derives its nourishment by sucking the sap from the cells, to poison which would mean the destruction of the same. Most prominent among the remedies proposed in the past few years have been spraying with toxical solutions, whale-oil soap being foremost. Sulphuring in the early part of the season has been advocated as a partial remedy. Carrying a lighted torch through the vineyard has also been suggested. An important aid to their destruction has been brought about by turning sheep into the vineyards in the fall, whereby the eggs and insects are eaten on the foliage or trampled under feet. This, however, has proved inconvenient in many cases, and cannot be recommended as a general remedy.

During the past week experiments have been conducted by myself at the "Olivina" Vineyard, near Livermore, where, with the assistance of Mr. Smith, the proprietor, I have been able to devise a means which proves a complete success.

First, however, to test the value of previous experiments, we resort to spraying, sulphuring, etc. The following solutions were employed:

First—One pound of whale oil, mixed with one pint of syrup, and then diluted with one gallon of water.

Second—One half gallon of syrup with one gallon of water.

Third—Two pounds of whale-oil soap to one gallon of water.

Fourth—Four pounds of whale-oil soap with one gallon of water.

Each and all of these were carefully applied to the infected vines by means of the Cyclone nozzle.

The strongest solutions of soap were such as to burn the tender leaves of the vine, so noticed a day or two later. The strongest solutions of the syrup likewise proved detrimental to the foliage; but with all, alike, the hoppers continued their work undisturbed. Twenty minutes after the applications were made (and they were made thoroughly), the hoppers were found on any and all of the vines treated, and in as great abundance as before. In many cases they had been forced to the ground by spraying, where it was thought the wings would become clogged, and their further recovery thereby prevented. A short time afterward, however, careful search revealed their absence from the ground, and remedies of this character were accordingly abandoned.

Sulphur has been dusted on the vine to such an extent as to render the foliage yellow, but shortly afterwards the hoppers were found uninjured, and continued so.

A torch carried at night has proved a failure.

EARLY MORNING TRAP.

A contrivance for holding petroleum in pans was then arranged so that it could be placed under the vine. This employed night and morning will prove an effective trap; for on shaking the vine the hoppers drop into the liquid, and so become destroyed. Still, the apparatus for this purpose must be so elaborate and expensive as to form a potent objection to its use for operations on a large scale. For this I therefore substitute a screen made out of green wire gauze, such as is ordinarily employed for window screens. The gauze should be stretched over a frame made of stiff wire, forming a screen circular in shape and about two and a half feet in diameter. A slot in one side will enable the screen to be placed immediately under the vine, the whole being attached to a stick in such a manner as to form a handle. We now have a trap for morning and evening work, for, by placing the screen under the vine, the hoppers will fall readily onto it; when there, they expire immediately if disturbed. Previously, the screen has been coated or smeared over with common kerosene. A piece of canton flannel or other heavy cloth, fuzzy side up, may be stretched under the gauze, and will serve to keep the screen oiled; for after some exposure the oil loses its property of killing at first contact. In fact, for this screen a cloth without the gauze may be employed, if desired.

THE MIDDAY TRAP—HOW TO MAKE A TRAP FOR MIDDAY WORK.

For day work, which is the time when most of the operations must be conducted where large areas are to be treated, a different contrivance must be formed. For particular instructions, the following will direct any one:

For short prune varieties, first: The operator should be provided with twenty feet one-fourth inch iron rod, or an equal length of heavier wire approximating to this in size. Cut two pieces seven feet long each and two pieces three feet long each. With these, two semi-spheres may be made with a diameter of about two feet (these measures may be increased proportionately to make a large trap). A strip of green wire gauze six feet long and three feet wide will answer to cover the trap. The gauze should be material commonly used in window screens, and worth about $2\frac{1}{2}$ to 3 cents per square foot. Do not try substituting cloth for gauze, for our experiments proved it inapplicable. Bend the seven-foot length in a circle three feet in diameter, turning the ends together and twisting them outward to serve as a handle. Cross the circle with a second piece three feet long, which should also bend in a circle outward; this forms a semi-sphere. Now cover the whole with gauze, which may be sewed on like the parts to a cover of a baseball, attached by means of a string.

Make a second semi-sphere similar in every respect to the first, and such that the two when brought together form a complete sphere.

The circle of the first semi-sphere may be provided with a notch to accommodate the body or trunk of the vine, thereby enabling the operator to completely cover the plant and provide against the escape of the hoppers.

Care should be taken in forming the notch to see that it is so placed

in relation to the handle as to enable the operator to stand partly over the vine when bringing the trap together.

The gauze of this trap, if rubbed over with a cloth or swab saturated with kerosene, will retain enough to kill immediately the hoppers alighting thereon; experience has proved, however, that after a little exposure the kerosene loses its greatest effectiveness and the hoppers are therefore enabled to take a second jump, and assisted by falling may escape through the opening or joint below. To obviate this and avoid the necessity of replenishing the kerosene so often, a piece of flannel or similar cloth should be drawn tightly and sewed over the bottom part of each semi-sphere, the edges turning upward into the trap as it appears when closed, so that any of the victims tumbling down will lodge between it and the gauze, where the density of the oil will end their endeavors to escape.

ANOTHER AND BETTER FORM OF TRAP.

I find that for different vines, different shapes are preferred. The following described appliance is the best and most commonly used at the time of this writing, though somewhat more expensive than the first named:

Frame two semi-cylinders, using for this purpose iron bands one eighth inch thick and one half inch wide, which should be joined with rivets at the corners. These parts should be hinged together with small butts, which may be riveted to the frame, such that, when covered with green gauze, it may be opened and closed over the vines. This trap needs no top, but should be provided with a bottom of either heavy cloth or, what is better still, two semi-circular tin pans about one and one half inches deep, and so formed that in coming together to form the circle a space is left for the stump of the vine and stake, say eight inches long and three inches wide. A cloth or sponge should project from the edges of the hole to close completely about the vine when in use.

For vineyards under ten years old, and some even older, eighteen inches is a sufficient diameter for the cylinder, which should be about two and one half feet high to accommodate long primed varieties. The last dimension may, however, be modified to accommodate the shape of particular vines. A portion of the upper part of the frame left free will serve as handles, or these may be added if desired, in which case they should be attached near the upper center of each semi-cylinder.

Smear the gauze over with ordinary kerosene oil, to which a small amount of crude petroleum may be added if convenient, as this will serve to thicken it and render it more lasting; the oil to be applied by means of a brush or cloth as often as seems necessary.

The operator now approaches each vine cautiously, and, inclosing it in the trap, kicks the stump of the vine below, if using the spherical trap, or disturbing it above if the cylinder is employed, which causes the hoppers to fly off, and, encountering the gauze, come in contact with the kerosene, which kills them immediately, or causes them to drop to the bottom, where a second contact with the oil leaves them unable to move. The trap should be retained about the vine for a moment to insure the destruction of all the victims before opening it again for their escape.

In our work, after making the parts according to the above description,

and operating on a few vines, the green gauze was changed to a yellowish hue by the myriads of insects captured. Either apparatus is light and easily handled; they should not weigh over five pounds each.

With one appliance a man should get over several acres per day, and the total cost of treatment, including oil used, should not much exceed 50 cents per acre.

To use the trap with best success it should be employed at the present season. With the increase of foliage and enlargement of the vine the trap must also be enlarged, becoming more cumbersome and more difficult to wield, though equally effective.

Very windy weather should be avoided for this work, as many retreat into the ground at such a time, and the few remaining on the leaves are disturbed with great difficulty at such times.

When the air is still, or but little wind is blowing, and when the warm sunshine has removed the dew from the foliage, then is the most favorable period for general success.

A great advantage in early season work accrues from the destruction of the insects previous to the time of laying their eggs, thereby lessening the chance of damage.

Vines laying on the ground, like those pruned on the Chaintre system, or those tied to wires, would require a semi-cylindrical screen, lined with cloth at the bottom, which latter should be turned up to prevent their tumbling off, the screen being so formed as to cover the foliage. Extermination in this case would prove difficult, as we have no means of catching those which drop on the ground. But by operating in the heat of the day, and when a slight breeze would take them on the screen, the insect will fly to it and be completely entrapped by the oil which has been placed on the gauze and cloth.

Before closing this treatise, I desire to express particular acknowledgment to Mr. J. P. Smith, of the Olivina Vineyard, and to his foreman, for their kind assistance and interest in the experiments which have been conducted at Mr. Smith's place. To successfully accomplish our work has required no small degree of patience on their part, and I have to thank them for it, and for their advice in devising the different means tried.

The hoppers have increased in the Olivina Vineyard, during the past three years, to such an extent as to become alarming. Many leaves already put forth are withered by their attacks, and some other sections report a similar condition of affairs.

It is now my belief that prompt and energetic attention to the above detailed method will remove all fear of damage to the grape.

In the past two years the Commission has experimented with and provided ample remedies for all insects consuming directly the foliage of the plant. The arsenic and bran remedy enables us to meet the grasshopper plague successfully, and Paris green or London purple, mixed at the rate of one pound to one hundred and sixty gallons of water, will destroy other foliage-consuming insects, and has been proved innocuous to the fruit, vine, or raisin. The scribe, the flea beetle, and other insects, may likewise be trapped by the above described apparatus.

Up to this time, the vine hopper has proved a constant menace to the grower, but from this it is to be hoped dates our victory in the field.

J. H. WHEELER,
Chief Executive Viticultural Officer.

THE DESTRUCTION OF ANIMAL AND VEGETABLE PARASITES OF THE VINE.

Recommendations by the Chief Executive Officer of the State Viticultural Commissioners. A resumé of rules and remedies adopted to the present season.

The present being the season of greatest activity in the operation of combating vineyard pests and diseases, many of which appear so suddenly in some of our vineyards as to leave no time for the proprietor to waste in looking up the results of former experiments or remedies described in some lost paper or publication, it has seemed a fitting time to publish a brief abstract or summary of the principal vine pests abroad at the present moment, together with the best known means of destroying them.

CUT WORMS

May, if few in number, be found at night with the aid of a lantern, when they are preying on the leaves or young shoots. Another method is to dig them out of their hiding places near the roots of the infested plant in the daytime, as they retreat with the appearance of daylight just below the surface of the ground.

If in sufficient numbers to warrant, spray the vine with a solution of Paris green (which must be agitated continuously while using to prevent settling), one pound to one hundred and fifty gallons of water. This will not harm the fruit or plant, even though the grapes have attained half the size of a pea. If it is feared that live stock may get to the foliage, and thereby become poisoned, apply the same solution to cabbage leaves, which, if placed near the troubled vines, will attract the attention of cut worms and destroy them. Afterwards these cabbage leaves may be picked up and destroyed, or left to wither without danger.

To apply the Paris green solution, use any good spray pump; or even a syringe will answer for operations on a small scale.

SPHYNX MOTH, OR ARMY WORM,

As sometimes improperly called: Spray with Paris green as above, using one pound to one hundred and fifty gallons of water. Treat particularly well the outside rows of the vineyard, and they will never get farther than these. If only a few worms infest the vines, they may be hunted on the foliage and destroyed by hand.

GRASSHOPPERS.

This plague has been successfully met by the use of arsenic and bran remedy, prepared as follows:

Forty pounds bran, fifteen pounds middlings, two gallons cheap syrup, twenty pounds arsenic, mixed soft with water; a tablespoonful thrown by the side of each vine or tree. Cost, per acre: for trees, 25 cents; for vines, 50 cents.

If placed on shingles about the vineyards, much of the poison may be afterwards gathered up and saved.

Complete success has resulted from the use of this remedy, as the grasshoppers eat it greedily and die in their tracks.

For this may be substituted with equal effect the Paris green spray, applied as for cut worms.

THRIPS

Are best trapped by means of two semi-cylinders framed with band iron and covered with window gauze; these hinged together on one side should be provided each with a semi-circle pan for a bottom, so arranged that the whole may be closed about the vine. Rub the gauze over with a rag saturated with coal oil and place a little also in the pan at the bottom; then when the whole is closed about the plant, kick the stump of the vine or disturb the foliage by introducing the hand or a stick from the top, and the insects fly to the gauze, where contact with the coal oil destroys them. For full particulars regarding the construction and method of operating this trap, see second appendix to Report of Chief Executive Officer for 1888.

Thrips cannot be poisoned on the vine, as they subsist on the sap alone, which is sucked from the leaves, thus causing them to wither and dry up.

THE FLEA BEETLE

And others of this class which consume the foliage of the plant, giving to the leaves a riddled appearance, may be trapped also with the above named contrivance, for commonly any slight disturbance causes them to drop to the ground, where they secrete themselves.

A better method, however, where circumstances will permit, is to spray the vines with the Paris green solution described above.

THE FALSE CINCH BUG

Is of a grayish brown color with pupa of about the same color. Both are, when full grown, about one eighth of an inch in length. They appear occasionally in spots in the vineyard, infesting such vines in great numbers and consuming the leaves. They fall to the ground when the vine is disturbed, where they are scarcely visible. They have caused our vineyardists no serious damage, as they disappear after a short season, and have not at any time in the past become general. They may be easily caught with the gauze trap and kerosene, or may be poisoned by the Paris green spray.

HARES, RABBITS, AND SQUIRRELS

Have been a constant menace to young plantations made in new districts. A tight fence affords the most perfect immunity from their attacks. Squirrels may be kept out by making a tight fence along the side of their approach. They will not travel far to go around this, unless the place is very much isolated, because of their fear of dogs, hawks, and other natural enemies.

Hares which come a long way to devour the vines will be noticed to confine their attacks to a few vines at different places in the vineyard.

which they eat down as regularly as the new growth appears. A weak solution of asafetida prepared by dissolving in alcohol and then adding water, has been applied to the afflicted vines with good success.

These animals will also be destroyed by the Paris green solution if applied frequently during the early growing season.

VEGETABLE PARASITES (OIDIUM OR POWDERY MILDEW)

May be best prevented or removed by using sulphur, which should be applied, first, when the vine is in full bloom, being careful to dust or blow it well over the flowers. Repeat the dose about the middle of June, and later again, if any sign of the disease appears.

If for table grapes, the sulphuring may be continued monthly until they begin to change color. Sulphuring should, however, never be done to wine grapes after the berry has attained two thirds its full growth, as by so doing it reaches the wine and gives it a bad odor.

Let it be remembered that the disease begins its development where the average of day and night runs up to 52 degrees Fahrenheit; it spreads rapidly at 70 degrees Fahrenheit, and is checked in its growth where the thermometer indicates near 100 degrees Fahrenheit. Above 100 degrees its damage is rapidly diminished, and at 112 degrees—a temperature quite common throughout the interior vineyard districts of California—the germs lose their vitality and the effects of the disease entirely cease.

The sulphur used may be either finely ground or sublimed; the former is most commonly employed, as it is cheaper and answers the purpose equally well. It should be applied so as to lodge as much as possible on and near the growing parts of the vine. This secures a dense sulphur vapor in direct contact with the diseased organs. Sulphur on the old stump, or even on the surface of the ground, will destroy the oidium, but a large quantity would be required.

COULURE,

Though not itself a direct disease, results from other evils. It is, in a measure, prevented by sulphuring at the time of blossoming, when oidium, which would otherwise interfere with the fertilization of the flower, is removed. This is not always a cure, however, as other causes exist for the evil, principally sudden changes in weather, either hot and dry or cool.

The most successful treatment for the trouble when so occasioned results in *pinage*, the process of pinching off the ends of the fruit-bearing shoots when flowering begins. Also, the annular incision may be adopted, which consists in ringing out with an appropriate tool a band on the outer bark of the fruit-bearing cane or shoot just *below* the point where the bunch stem joins the shoot. Nipping off the end of the long bunches will also aid in keeping the remaining fruit on, and cause it to ripen large and full.

The foregoing disposes of those enemies most common to our vineyards in the past, with the exception of the phylloxera, which, though most formidable of all, has been discoursed on at sufficient length before.

J. H. WHEELER,
Chief Executive Viticultural Officer.

GRAFTING TO MUSCATS.

The following circular and questions explain the objects of this publication:

STATE OF CALIFORNIA, BOARD OF STATE VITICULTURAL COMMISSIONERS,
OFFICE OF THE CHIEF EXECUTIVE VITICULTURAL OFFICER,
SAN FRANCISCO, August 15, 1888.

DEAR SIR: During the next spring many grape growers, who have in the past cultivated grapes for wine making, will graft their vines onto Muscats for raisin-making purposes. From those who will make this change there have come to me numerous inquirers as to the suitability of ordinary varieties for such grafting.

The experiences of the past on the subject are somewhat conflicting, but, knowing there have been trials enough already made with this grafting to determine its value, if the results were but known, I am endeavoring to collect them for the instruction of the public.

Believing you may be able to assist me with your knowledge or experience, I have taken the liberty of addressing to you the following questions, which you will please answer by mail, at your earliest convenience.

If unable to answer these questions from your own experience, will you kindly note, under the head of "Remarks," whatever information you may have received from others regarding the success of grafting Muscats onto other stocks.

Very respectfully,

J. H. WHEELER,
Chief Executive Viticultural Officer.

The questions were as follows:

1. Have you ever grafted Muscats on the roots of other varieties; and if so, what were the other varieties?
2. When was your grafting done—what year and month?
3. About what percentage of the scions grew?
4. Do they now appear as healthy as do Muscats on their own roots?
5. Does the fruit set well and ripen equal to that of Muscats on their own roots?
6. Would your experience lead you to advise others to employ this method in preference to pulling up the old vines to plant Muscat cuttings?
7. Remarks.

ANSWERS.

A considerable number of the vine growers addressed were unable to report any experience; many, however, were kind enough to write me their opinions, for which I desire to publicly express thanks.

I have selected from the many letters received the following, which have been condensed as much as seems consistent with clear expression. To indicate the questions above given, their numbers are employed:

J. Knauth, Sacramento.—7. Would prefer grafting on most any kind of robust grower if Muscats are desired.

H. G. Ellsworth, Niles.—1. Various. 2. Varying throughout twenty years past. 3. Good results generally, but followed by knotty accretions on roots. 4. A small per cent. 5. Think it is not so good. 6. Would not graft old stock; would graft stock one, two, or three years old.

J. C. Merithew, Cupertino.—1. Grafted one hundred Muscats onto Trousseau. 2. March, 1880. 3. 99 per cent. 4. In good order. 5. The same. 6. I would advise grafting.

W. E. Cole, Brooks, Yolo County.—1. Grafted three hundred Mission onto Muscats. 2. 1878. 3. 85 per cent. 4. Produce better wood than Muscat roots. 5. They are the heaviest bearing Muscats I have ever seen. 6. Yes. 7. The Mission is preferred for this grafting, because it best stands the summer heat, and is a strong grower.

John T. Doyle, Cupertino.—1. Grafted on Charbono. 2. March, 1888. 3. 99 per cent. 4. They look perfectly well. 5. Cannot yet determine. 6. I should graft by all means. 7. I think you can graft any one sort on another, and if the work is well done your grafts will grow perfectly.

J. A. Brun, Oakville.—1. No; we never have, but we have grafted other varieties on Muscats which did not prove a desired success. Would advise grafting Muscats onto other stocks.

W. A. Sanders, Sanders, Fresno County.—1. Yes. 2. February. 3. 90 per cent. 4. Yes. 5. Yes. 6. Yes. 7. Grafted three thousand vines, part to White Corinth.

Wm. M. Johnston, Anderson.—1. Yes, onto Mission, Feher Szagos, and a nameless seedling. 2. March 1, 1881. 3. 90 per cent. 4. No. 5. No. 6. No. 7. Vines made feeble growth after first year, small bunches, much inclined to coulure and sunburn; old stumps decay and become unhealthy. Grafts strike roots.

E. W. Maslin, Sacramento.—1. Grafted ten Muscats on *Vitis Californica* roots two years old. 2. April, 1887. 3. 80 per cent. 4. Unable to judge from experience. 5. Not yet old enough. 6. I should certainly graft. 7. The union is perfect—grafted *at* surface and hilled soil about it. I prefer this to deep grafting; as, if graft fails, we have still the old vine.

R. C. Kells, Yuba City.—1. Yes, onto Mission, Riesling, Hamburg, Rose of Peru, and others. 2. March and April, 1887, 1888. 3. 90 per cent in 1887; 75 to 80 per cent in 1888. 4. They do on the Mission root. 5. Yes, on the Mission but not on others. 6. Yes; but on Mission only. 7. Have grafted Seedless Sultana and Zante currants on Mission and they do well. Mission does not sucker as do the others.

Robert Barton, Fresno.—We have never grafted Muscats on other roots, but have noted it done in this section to considerable extent and apparently with success. Colonel Forsythe has grafted on Zinfandel. J. W. Pew on Sultana. Growth of the grafts seems to be first class.

F. D. Rosendahl, Kingsburg.—1. Have grafted Muscats onto Zinfandel. 2. February and March, 1886, 1887, 1888. 3. All grow when the work is well done. 4. Better and stronger than on their own roots. 5. The first year only a few bunches, but full crop next year, and fully as good as on its own root. 6. "Don't pull up the old vines, but have them grafted if you want a good vineyard."

Capt. J. Ch de St. Hubert, Fresno.—1. Upon Tokay and Malvoisie. 2. January, 1883. 3. A fair average grew. 6. No.

G. W. Linderman, Madison.—1. Yes; on Mission. 4. They do better than when grown on their own stalk; berries good size and bunches large. To raise Muscats, would plant Mission roots and graft to Muscats.

B. R. Woodworth, Fresno.—1. Have grafted Muscats onto Feher Szagos. 2. March and April, 1887. 3. 40 per cent. 4. Apparently so. 5. Fruit ripens later. This year had considerable crop; some of it will not mature. 6. If old, would tear them out and plant Muscat roots in preference to suckering grafts, etc.

Thomas Rose (for A. M. Witham), Woodland.—Grafted one hundred Zinfandel over onto Muscats in 1887. Ninety-eight grew, and this year yielded ten pounds of grapes per vine.

C. A. Crosby, Riverside.—1. Yes; onto Mission and Rose of Peru—twenty-five vines. 2. January, 1886. 3. All grew. 6. No.

J. F. Winsell, Balls Ferry.—1. Yes; on Flame Tokay and Mission roots. 2. March, 1884. 3. 50 per cent; attribute great loss to my grafting too late, as sap drowned the graft. 4. They do. 5. Alongside of others from cuttings, I can observe no difference. 6. I certainly should; it is less trouble to graft, and they bear the second year. 7. A friend grafted Missions to Muscats fifteen years ago, and they still bear fine grapes.

—, Escondido.—1. Grafted onto Mission, Rose of Peru, Black Hamburg, Zinfandel, and Carignane. 2. February, March, April, 1885, 1886, 1887. 3. In 1886, 85 per cent on two thousand four hundred Zinfandels; in 1886, 60 per cent on six hundred Hamburgs; in 1885, 90 per cent on five hundred Rose of Peru; in 1887, 60 per cent on five thousand Carignane, grafted in March and April. 4. Yes; on the Hamburg and Rose Peru—not so well on Carignane and Zinfandel. The thriftiest growth was on the Rose of Peru. 5. Better on the Hamburg and Rose of Peru—about same on Carignane, but not so well on Zinfandel. 6. Much better to graft unless stock is too young; even then it is all right on vigorous varieties.

Dr. W. S. Manlove, Perkins, Sacramento County.—1. Grafted Muscats on Mission and Feher Szagos. 2. March, 1873, 1878, 1884, and 1888. 3. 98 per cent. 4. On the Mission they do not; on the Feher Szagos they do. 5. It does not on the Mission. 6. No. 7. Would not graft white varieties on purple stock. Fifteen years ago grafted Tokay onto Dutch Sweetwater; they grew and bore well, but never colored as it does on its own stock, or when grafted on purple varieties.

W. H. Wells, Dixon.—1. Grafted three thousand onto Mission roots, which were ten or twelve years old. 2. March and April, 1873–4–5–6. 3. 75 per cent. Where not successful first time, regrafted until I got a good stand. 4. They are more thrifty, longer canes, and more foliage than Muscats on their own roots. 5. Fruit sets and ripens well, and the grafts yield better crops in every respect than Muscats on their own roots. 6. Graft instead of pulling up; for if well done, the grafts will yield more second year than vines five or six years planted.

Chas. Wilkinson, Etiwanda.—1. Grafted Muscats onto Mission, Tokay, Seedless Sultana, Rose of Peru, Zinfandel, Malaga. 2. March, 1887. 3. 95 per cent. 4. Grow well on all these varieties as strong as on their own roots. 5. Bore three to five pounds per graft this year, clusters large and good as those on five-year old Muscats. 6. Would graft every time. 7. I have planted Peru for express purpose of grafting to Muscats.

H. Dugdale, Etiwanda.—1. Yes; on Mission and Zinfandel. 2. Early in March, 1887. 3. 75 per cent. 4. More healthy. 5. Equally as well. 6. Would advise it, by all means. 7. All wine grapes may be so grafted. To graft successfully, remove the earth deep about the stock; saw off beneath buds or sprouts; split with chisel and mallet; scion six inches long, wedge-shaped, to fit the split when opened; make bark even on outside; wrap with strip-cloth, to keep dirt out, then fill up hole with earth.

C. O. Tucker, Ballena, San Diego County.—1. Grafted onto twenty

other varieties, principally Mission, Black Hamburg, Rose of Peru, G. Chasselas, and Zinfandel. 2. March, 1880; March and April, 1881; April, 1882; May, 1883, and May, 1884. 3. In 1880, on Mission roots, 98 per cent; 1881, on same, 93 per cent; 1882, on a variety of roots, 80 per cent; 1883, same, 76 per cent; 1883, same, 81 per cent; 1884, same, 60 per cent. 4. Ora Mission, Black Hamburg, and Rose of Peru, yes; on other varieties, except Zinfandel, no; on Zinfandel, more healthy, but don't set fruit so well as on their own roots. 5. On Mission and Black Hamburg, fruit sets better than Muscats on their own roots; on Rose of Peru, don't set as well, and suffer from coulure; on Zinfandel, don't set well, but ripen well; on other varieties, no. 6. With Mission, Black Hamburg, Rose of Peru, and Zinfandel, yes; other varieties I have tried, no. 7. Prefer common cleft graft, eight inches deep on old stocks; two or three inches on young stocks. I employ with best results a wax—one part beeswax, two parts resin, three parts tallow. Had most failures when I used equal parts of clay and cow-dung. Graft in cloudy weather. For scions, use laterals. Would not graft on Pineau, Chasselas, Riesling, Tokay, or Sauvignon. Employ no man of bilious temperament.

Geo. H. Craft (for others), Redlands.—Grafted miscellaneous varieties to Muscats; results always satisfactory.

G. F. Merriam, Escondido.—1. Have grafted twenty-four vines to Muscats, viz.: Rose of Peru, Black Morocco, Mission, and others. 2. March 20th to April 10, 1883. 3. All. 4. Yes. 5. Yes; so far as I see. 6. Yes. 7. Where I used common cleft graft most of scions grew; but I one year used Dr. Cougar's machine and lost over half. Do not let any one use the machine. Raisin growing in this locality very unsatisfactory.

J. J. Stephens, Madison.—1. Yes; have grafted onto Mission stock. 2. March, 1872. 3. 94 per cent. 4. Yes; more vigorous. 5. A great deal better. 6. Yes; with us Muscats do better on Mission roots than on their own.

John Hall, Riverside.—1. Yes; onto Mission. 2. March and April, 1879 and 1880. 3. 90 per cent. 4. Yes. 5. Yes. 6. For a whole vineyard, would advise planting Muscats; but for occasional Missions or other varieties, would graft.

E. Z. Clanton, Woodland.—1. Yes; onto Mission, Hamburg, and Tokay. 2. December, 1886–7. 3. 99 per cent. 4. They look healthier. 5. Yes. 6. By all means. 7. Have had grafts bear the first year; they bear well the second year. Have had difficulty in getting cuttings to grow where old vines were pulled up; lost 50 per cent.

J. M. Asbell, Millville, Shasta County.—1. Have grafted Muscats onto Mission roots three and four years old. 2. 1869 and 1870. 3. 90 per cent. 4. About the same. 5. They set fruit well, and ripen fruits equal to Muscats on their own roots. 6. Would advise grafting, as it loses no more time than one year.

George W. Applegate, Applegate.—1. Grafted onto Mission roots. 2. March, 1880. 3. Used cleft graft, and scarcely scored a miss, using two scions to the vine. 4. Yes. 5. Yes. 6. Yes, you secure by grafting an enormous growth the first year, and the second year a crop of fruit; the only difficulty is that of suckering. 7. Used cleft graft, two scions to each subject, spreading the vine with a wedge to insert the scions; used clay as a mastic. Would graft any kind rather than pull them up, as they bear grapes the first year.

H. Goepper (for his neighbors), Santa Ana.—1. Grafted onto Mis-

sions. 2. At different periods, but with best success at time buds were about to open. 3. 80 per cent. 6. It would.

A. J. F. Whitthouse, Fresno.—1. Yes, onto Zinfandels. 2. Latter part of March, 1887 and 1888. 3. 75 per cent in 1887. 40 per cent in 1888. 4. Yes. 5. Yes. 6. Yes. 7. If grafting in alkali lands, would cover union with grafting wax, as I found many stumps rotten and scions dead.

C. K. Kirby, Fowler Station.—1. Yes, onto Trousseau. 2. March, 1888. 3. 90 per cent. 4. They do. 5. Not yet crop enough to tell.

Charles McLaughlin (per Kirby), Fowler.—1. Grafted onto Mission, Feher Szagos, Zinfandel, and S. Sultanas. 2. 1887. Find Zinfandel and Feher Szagos best stock to graft on, and Muscats do better on Mission and S. Sultana than they do on their own roots. If desiring a Muscat vineyard, would plant strong growing roots and graft Muscats onto them. Other experiences in this section confirm the above.

C. O. Rust, Anaheim.—1. Grafted onto one hundred Zinfandels. 2. March, 1882. 3. 80 to 90 per cent. 4. Yes. 5. Yes. 6. Would advise grafting in preference to pulling up, provided the vines are not too old, and in good shape.

C. M. Silva & Son, Newcastle.—1. Yes; principally on a Mission. 2. March, year forgotten. 3. 95 per cent. 4. Yes, if not better; growth is stronger, but soil may be better. 5. Yes. 6. Yes; if old stocks were perfectly healthy. 7. Grafted by digging down three or four inches below the surface of the ground, sawing stock square off, split it down with a chisel, cut the graft wedge-shaped; inserted one in small, two in old stocks; brought the soil up around them, pressing it carefully around the graft, allowing one bud of the scion exposed; greatest loss was by knocking out in cultivating.

H. C. Morrell, Wrights.—1. Yes; onto Feher Szagos, Miller's Burgundy, Franken, and Gray Riesling. 2. February, 1875. 3. 95 per cent. 4. Much more so. 5. Much better; do not coulure like Muscats on their own roots. 6. Would graft on any strong grower, but not on Burgundy or Riesling, as the vine takes the habit of the old root, and the berries are then small, tough, and unfit for market.

D. C. Feely, Alma.—1. On Mission, Black Hamburg, and Catawba. 2. March, 1870 and 1877. 3. 95 per cent. 4. Yes. 5. Can notice no difference in respect to the fruit. 6. If stocks are healthy, would graft in preference to digging up. 7. I cut my scions early in January; then I dig a shallow trench on the north side of a building or fence, and lay my cuttings in and cover with soil to the depth of two or three inches. I sometimes cover them over with boards, to prevent the rains of winter from rotting them. A good way would be to put the scions in a cellar and cover with sand. The buds should be kept in a dormant state until the grafting is done. The best time to graft is when a flow of sap is moving to swell the buds and bring forth the leaf on the vines in the early spring. This may occur earlier in some localities than in others; but, as a rule, March is the best time to do the work.

N. D. Harwood (by C. A. McDougall), Escondido.—1. Yes; on Mission, Hamburg, Rose of Peru, Tokay, and some others. 2. February, 1880-1-2. 3. 95 per cent. 4. Yes. 5. The size and quality of fruit is improved. 6. If roots are healthy, by all means graft them and secure fruit from the start. Have tried grafting by cutting into side of the stump with a chisel, but the grafts fare like the "titman pig."

B. P. Mackoon, El Cajon.—1. Yes; Mission, Zinfandel, Blanc Elbe, Verdal, Sweetwater—first three, chiefly. 2. February and March, 1885–6–7–8. 3. 90 per cent; when great care was used, all grew. 4. Yes; many of the strongest vines in the vineyard are those grafted on other roots. 5. Fruit sets equally well; the first and second year of bearing, the fruit ripens a little later. 6. “A thousand times, yes.”

Estate Geo. A. Cowles, by B. P. Mackoon, Superintendent.—The experience on my own place answers for this, as confirmed by the foreman, who was on the Cowles place when the grafting was done. When the graft did not grow, or where injured by accident, we have dug a little lower and cut off and grafted the old stock anew the next year, with just as good results as in first grafting.

A. F. Anderson, Blacks Station, Yolo County.—1. Yes; onto Mission. 2. When buds are swelling, and just before they put forth, in 1873–4–5. 3. 90 per cent. 4. I think they do. 5. Fully as well. 6. Would graft, as fruit comes two or three years sooner.

———, Anaheim.—1. Have grafted Muscats onto several varieties, with best results on Mission roots. 2. Last of February and fore part of March. 3. 98 per cent. 5. The fruits set fully as well as Muscats on their own roots. 6. Would not graft again.

T. F. Miller (for a neighbor), El Cajon.—1. The general appearance of the grafts the first year was good, and they appear as healthy as Muscats on their own roots. I would graft in preference to pulling up old roots.

Wm. C. Walsh, Escondido.—1. Onto Mission and Rupestris. 2. March, 1886. 3. 100 per cent. 4. Yes. 5. Equally as well. 6. Would graft in order to secure a large grape and large bunch. 7. Have had twenty years' experience in this work. I put two scions in a stock of one inch or more in diameter, which is split with a chisel or sharp hatchet. I cross scions on the liber or inner bark just the least particle, and put a piece of folded paper between the scions on the crown of the stock to keep the soil out, and if both grow, destroy the weaker scion.

J. H. Harlan, Woodland.—1. Mission. 2. March, 1887. 3. 80 per cent (grafting done by inexperienced hands). 4. Yes; and far better. 5. Yes. 6. Yes; would graft on any strong grower to secure fruit sooner and a better stock.

H. Davenport, Fresno.—1. Have grafted Muscats onto Malagas, Feher Szagos, Mission, and Rose of Peru. 2. March (early), 1887. 3. 75 per cent. 4. Yes; the most of them. 5. Fruit sets well, bunches good, and ripens equal to Muscats on their own roots. 6. Decidedly so; without any doubt. 7. The year I grafted I gathered fruit, very fine bunches—mostly second crop. This year I gathered about twenty-five pounds from each vine—first crop.

Levi Chase, San Diego.—1. My foreman grafted Muscats on white wine grapes—name unknown. 2. March, 1888. 3. 90 per cent. 4. They appear perfectly healthy and made, this summer, an extraordinary growth. 5. But few small bunches set on them this season. 6. I think it a success and shall graft more next spring. 7. The old stocks are cut off below ground and a hole bored into it with a bit; the graft is then fitted snugly into it and covered with earth, except one bud.

CONCLUSIONS.

From the above, it may be safely inferred that with the exercise of proper care in the operations of grafting the Muscat forms no exception to the general rule, viz.: that the placing of any variety on a stronger root than its own will produce better results than will the same variety on its own root.

Of the total number of experiences reported above, forty-eight in all, we find but five where the writer unqualifiedly would not advise grafting other varieties to Muscats in preference to pulling up the old roots and planting anew. Four would advise grafting only under certain favorable conditions. While many of the large majority who advocate the method, speak enthusiastically of their success. I should venture the opinion that, if those who might object to grafting instead of replanting were called upon to make cuttings or even roots grow in land which had been drawn upon for many years by old vines, they would find the undertaking far more serious than they might at first suppose. Let no person believe that the young vines will grow in the exhausted soil of an old vineyard as they would in new ground.

Many vineyardists advocate the planting of such strong growers as the Rose of Peru for the express purpose of grafting to Muscats, and this, too, after many years of experience in the matter. Few would wish to graft such varieties as Rieslings, Pinots, or Burgundies, so that the objection to them as weak stocks need not be dwelt upon. The Mission and table grapes form the favored stocks, and have afforded us the greatest number of examples, though the Zinfandel has also proved satisfactory.

The conclusions shown in the above answers need no comment as to the general result. They prove plainly that *those who contemplate the grafting of Muscats onto wine or table grapes are by wide experience safe in the undertaking.*

Incident to the results here named, there has appeared with these reports other important information, seen under the seventh head—"Remarks."

Grafting by machine has proved unreliable, and growers are warned against their use, notwithstanding they may, on certain occasions, have proved satisfactory when operated by their inventor. L. Chase, of San Diego, describes a method which has before been unsuccessfully employed by others, and which in the hands of his foreman has succeeded admirably; but I should caution others about adopting these novelties for work on a large scale, as a long and dear experience has proved that for general utility the wedge graft is surest and best.

Several of my correspondents have favored me with particulars as to the methods employed in their work; several of these I have given in full, particularly if their results proved favorable, thereby confirming their methods. For instance, see reports of Wm. C. Walsh and H. Davenport.

Many dispute the value of applying any mastic or wax to the point of union. My own experience leads me to conclude that it is wholly unnecessary. Many successes are recorded where not even clay has been used, simply piling up the loose dirt about the graft. If, however, anything is to be employed, clay is the best.

It may be concluded that it is safest to tie in the graft. For this

purpose strips torn out of cheap cotton cloth, or raphia, which is sold by some of our seedmen, answers the purpose. Some of the above writers lament their loss by knocking the grafts out in cultivating, etc., and by examining their work we find that they have failed to tie in the scions.

Too much emphasis cannot be given to the value of properly caring for the wood to be used for scions, which should be cuttings, or, better still, whole canes, as pruned from the vine. From these the operator may, in the spring, cut scions large or small, long or short—wasting no buds. These should be imbedded, when taken from the vine, on the north side of some building, in trenches covered well with earth. For this purpose they may be tied into bundles or left loose. Do not be afraid that they will rot. A little mold on them will prove no injury. Where, for any cause, the grafts fail to grow the first year, experience indicates that the same subjects may be grafted again the following August, using for scions cuttings which have been healed in. Or, the following spring, we may regraft this with the same chance of success as was had at first grafting.

If you wish to secure the full advantage of the strong plant onto which the Muscat is to be grafted, care should be taken to remove all roots proceeding from the scion.

In concluding this inquiry, let it be understood that this work is not offered as one furnishing complete instructions for grafting; that has already been given to the public in a translation from the French, made by me some years since, entitled "Different Methods of Grafting the Vine," and forming Appendix III to the report of the Chief Executive Officer. This work was copiously illustrated, and copies may yet be had by applying to the Secretary of the Board.

WINES.

THEIR CARE AND TREATMENT IN CELLAR AND STORE, TOGETHER WITH
A SHORT TREATISE ON VINIFICATION.

By RAIMOND BOIREAU. Translated from the French by E. A. SCHNEIDER.

INTRODUCTION.

California wine makers are often heard to give expression to the hope that they may some day visit Bordeaux. They would inspect celebrated cellars and learn the "tricks" by which the merchants of that place attain their famous excellence. Several Californians have visited France for this purpose—returning abundantly provided with grape-growing information, but still deficient in knowledge pertaining to the cellar and store.

The reticence observed among French merchants and manipulators is a trait common to all good merchants, for which fact we may properly withhold our censure. Nor do the French wine merchants come to us to deal out gratuitous information as do foreigners representing many other branches. We find them too zealous in the interest of domestic productions for this; too patriotic to leave home. And, then, a term of apprenticeship in foreign wine houses will not supply one with all that is requisite in this branch; we are obliged to look to their literature for further aid.

The present volume is compiled from a long term of experience in the cellars of Bordeaux and Paris; and, although no book alone can make an efficient cellar master, it is thought the contents of this work, added to the practical experience already possessed by many of our wine makers, will serve to improve those qualities of our goods which render them more marketable.

The theoretical part of wine making has been abundantly developed in California. The need of the present is practical knowledge of finishing operations. Accordingly, this translation contains no chemical formulae, nor is anything given which the common laborer who reads will fail to comprehend. Boireau's work cannot be called an elementary work. Still it does not imply any theoretical explanation of reasons for the facts stated. The explanations are found in the previous knowledge of practical work and natural, every-day operations familiar to any one working in wines.

This book, it is thought, will assist in determining how to make the most palatable beverage with the materials at hand; how to make our wines attractive and sought after. It describes many of the so called "tricks" which will properly improve our "stock wines," and details fully the best methods of guarding against their deterioration and loss.

It is evident from recent experience that greater care is needed in maturing and aging California wines. We have had the "age of grape growing," and the present may be properly styled the "age of merchants." These merchants, whether evolved from the grape growers or

originating as such, must see that our wines are better nursed for the first eighteen months. They must be watched, as the French aptly term it, "jus like ze little baby." Much wine is spoiled in making, but more of it suffers defect after it leaves the fermenting vat.

This appendix will be found to be a strict translation; and, relating more or less as it does to a technical subject, may not be as smooth reading as if it had originated in the English language. With this in mind the reader will forgive any defects found in expression of the text.

Chapters X, XIV, and XV of the original work have been omitted as being of little value in California. The first provides instructions for dealers and buyers, and is purely local. Chapter XIV relates to processes of distillation—a subject on which I am already engaged in preparing a handbook of instruction, one which will be more comprehensive than the chapter named.

Chapter XV contains the rules, laws, and regulations pertaining to the sale and delivery of vineyard products, and would be of little use here.

Part first is a single chapter from Boireau's Volume I, and as it is the only portion of this volume which relates to the cellar, it is combined here with the second volume. The subject of Part I is akin to that treated in Mr. Rixford's excellent compilation made some years since, and will, with that work, I think, adequately cover the ground.

Dr. Bleasdale's little translation on "The Vinification of Claret" should, in addition to Rixford's "Wine Press and Cellar," be in the hands of every wine maker. These will serve to perfect all operations preliminary to the subject of this appendix, and with the latter will form a fair beginning in the œnological literature of California.

Many of the instructions only casually stated in the following pages we discover to be those occasionally whispered about as secrets of great value known only to a few. Men among us have professed to be "wine doctors" (more aptly applied here than the term œnologists), with less than half the knowledge recorded in chapters ten and twelve. Among other novelties, the first chapter teaches the best mode of keeping wine sound for ulling purposes; close and moist cellars, it is stated, are needed to guard against sherry flavors and the taste of rancio—and the whole shows that far more regard for cleanliness must be had than is noticeable in many California cellars.

When told in the second chapter that, in racking, the bung-starter must not be used for fear of raising the lees, we are lead to believe that truly wine must be like "ze little babie," and that some modification of our rough and careless treatment must be had. The work on clarifying will be found a valuable addition to our literature, and will be useful to even the best informed. So on throughout the book, the cellar-master will encounter many surprises. In the illustrations, simple devices are furnished for diminishing labor and insuring improved results.

The chapter on aging wines could be advantageously improved by a description of Dr. Frazer's process of aging wines by electro-magnetism. A process not only producing good results in practice in California, but one receiving distinguished praise and recognition abroad, as attested by the conference recently reported at Dijon, where distinguished jurors pronounced strongly in its favor.

Pasteurizing has received a new impetus with the improvements made in apparatus, and this process is now a common resort among French

wine merchants. In the recent additions made to Mr. J. Gallego's cellars, at Irvington, may be seen an apparatus of the most finished nature—one particularly approved by the eminent expounder of the process called after him. An examination of this machine will convince the reader that more importance is now attached to the process than is accredited in Chapter X of this work.

No doubt some will find other parts of Boireau's work which appear somewhat antiquated or at trifling variance with the experience of the present day, or that belonging to California; but there is still enough of instruction left to make the study of the complete work well worth our while.

"Americans," it is often said, "do not take kindly to wine." This is because they begin with the cheap wines, which have received careless treatment and thereby lost their greatest charm. The mellowness, the pleasant aromas, and delicate sweetness have disappeared, replaced by hard acids, bitter newness, or excessive astringency. It is only another proof of their good taste that our people do not readily become customers for such goods.

Our numerous Conventions and sampling tests, together with the entertainment of eastern visitors on frequent occasions, affirm the conclusion that *Americans do like good wine and will drink the best and pay well for it* when they know where to find it.

The reasons why wine has not become an American beverage are many and apparent. If Americans had ever once become habitual wine drinkers, like many of the people who come to us from foreign shores, then, perhaps, not even harsh, sour, or poor wines would serve to alienate them from their desire for it. We might be able to dump into the market everything we could make, or as some one has jocosely remarked, "even wine made from grapes." But to successfully inaugurate the custom of drinking light wines proper for every day use, to make the benefits we claim for it common to all, we must have wines which *taste good* to all.

We find our eastern visitors and lady friends like sweet wines—principally for the sugar contained—to drink which they are made uncomfortable by the spirits commonly accompanying such wines. This, we must remember, too, causes wine drinking to be stigmatized as intemperate, and relegates the liquid to the category of stimulants, instead of classing it with health-giving beverages for daily use.

Give them the best mild light wines our California vineyards are capable of producing, treated as detailed in this book, as a substitute for the truly intemperate "sweet Catawba," common to the East but unknown here, and wine will cease to be a luxury, becoming a necessity, and a marked revolution will grow up in the opposition ranks. The arguments commonly urged by eastern prohibitionists emanate from the use of fortified wines, which they attempt to drink as we drink the lighter beverages. These arguments must be turned in our favor, and prove our earnest endeavors to be in behalf of true temperance.

But the proof of the pudding is truly in the eating thereof, and to insure the drinking of our wines they must be made tempting and wholesome. It is to the aid of the California wine merchants, in their endeavors to secure this end, that this translation is humbly inscribed.

JOHN H. WHEELER,
Chief Executive Viticultural and Health Officer.

PART I.—VINIFICATION OF WINES OF THE GIRONDE, AND OF ALL ORDINARY WINES.

CHAPTER I.

GENERAL REMARKS—DIFFERENCE IN THE PRICE BETWEEN THE FINE AND THE ORDINARY WINES.

General remarks.—Difference in the price of the fine and of the ordinary wines. Preliminary measures to the vinification of red wines. Vinification of high-grade wines of the Gironde. Varieties producing high grade wines. Nature of the soil and varieties suited to the production of fine wines. Vintage, stemming, foulage, fermenting tanks. Drawing off the murk. Vinification of the white wines. Vinification of the high quality white wines of the Gironde. Varieties. Varieties of a lower class. Picking the grapes; fermenting. How to augment the destiny of the must.

The fermentation has a decisive influence on the quality of the wine, according to the favorable or unfavorable conditions under which it was effected. The phenomena of the vinous fermentation have been the subject of serious study and observation by a great number of chemists and of physicists. In the beginning of this century a celebrated scientist, Count Chaptal, wrote a book on "The Art of Making Wine." Since the appearance of this work, a great number of books on wine making and on viticulture have been issued, but they offer to the viticulturist, as far as the practical vinous fermentation is concerned, but very few ideas which have not been hinted at by the illustrious author of "The Art of Making Wine."

Long ago, even before the publication of the work of Count Chaptal, the majority of the producers of fine wines in the Gironde applied to the fermentation of grape juice all of the improvements which are taught by œnology, a science whose objects are the vinification and the treatment of wines. The proprietors of inferior vineyards act very differently. It is painful to see how this class of people are neglecting the precautions which vinification requires. Good advice, however, has been given them often enough. Nevertheless, every year a great quantity of wine is made, which has already, on leaving the fermenting tanks, the germs of acidity in it; and the warmer the weather has been, and consequently favorable to the maturing of the grapes, the more frequently this defect is met with, a defect which has often no other cause than the neglect of the wine makers to prevent the access of air to the caps in the fermenting tank, and to draw off the murk at the right time.

The considerable difference which exists between the prices of the finest wines of the Gironde and those which are made from inferior varieties can be explained partly by the endeavors of the proprietors of first class varieties to improve their wines by all possible means, while the majority of those who possess ordinary varieties are only after the quantity of their output.

The proportion of the prices is on the average as one to ten. Thus, while the ordinary wines realize 300 francs per barrel, it not unfrequently occurs that 3,000 francs are paid for the same quantity of a wine of the highest quality, and sometimes much more. It is not possible to give exactly exact figures concerning this subject, because the *œnologie* has received very few exact figures concerning this subject, because the apparatus, and this process

to the abundance of the grape crop; on the other side, the prices of the fine wines are varying according to their excellence. It is not uncommon that the price of superior wines is ten times higher than that of ordinary wines in exceptionally good years; while in bad years, if the wines are tart and poor in body, their price is hardly more than double that of the ordinary wines.

It is, therefore, the direct interest of the producers of fine varieties to obtain perfect wines, in order to sell them at higher prices, while the producers of inferior wines are only anxious about the quantity. These latter calculate in the following manner: If we should stock our vineyards with fine varieties, we would have one fourth or one fifth less yield than from our varieties, which are ordinary ones, and the higher value of our wines would not cover the loss which we would undergo.

If the output of wines had not been diminished by the diseases of the vine, and if the price of the ordinary wines had remained on a lower level, there would be in the trade a demand only for wines which are able to improve on aging. Under such conditions it would be the direct interest of the wine maker to produce better wines in order to obtain a good market and higher prices; for then the higher value of the wines would be equivalent to the value of a more abundant output.

The inferior wines, though they may have been grown on good soil and in favorable sites, owe their inferiority but to poor varieties and to insufficient precaution during their vinification. But what can be the reason of this negligence of the wine makers? It can be attributed but to carelessness, because it is possible to improve the wine, beginning with the first year, without expense, simply by perfecting the processes of vinification and by selecting the proper varieties; thus we may obtain within a few years high-priced wines, instead of poor, ordinary wines.

We are going to speak in detail in the following pages of the various methods of vinification which are used in the Gironde and in the adjacent provinces. These methods can be reduced to two principal types: the vinification of the fine wines, which involve the practical application of improvements indicated by vinology; and the ordinary methods with their faulty customs and manipulations, which should be avoided. It is our intention to describe here only the *practical making of wine from grapes*, without the use of substances foreign to the juice of the grape. We reckon among the artificial wines those in whose preparation sugar, glucose, cream of tartar, water, tartaric acid, etc., have entered; we condemn the use of these substances in the production of fine wines.

MEASURES PRELIMINARY TO THE NORMAL VINIFICATION OF RED WINES— METHODS WHICH ARE USED IN THE VINIFICATION OF THE HIGH-GRADE WINES OF THE GIRONDE.

The finesse and taste of the high-grade wines of the Gironde is founded on the totality of the labor and attention which have been devoted to the wines, to the gathering of the grapes, to the vinification, and to the choice of good varieties as well as to the nature of the soil. The proprietor of a large vineyard can correct the imperfections and natural defects of his wine by blending the varieties intelligently. It is known that a wine is perfect if, after having reached its maturity—or, to use another expression, when it is bottle-ripe—it joins to a brilliant color a full body without

being dry, an aromatic, agreeable flavor and bouquet, and if it is mellow, and has preserved a decided fruity taste.

A wine is defective, even if it possesses fineness, if it is not supplied sufficiently with color and with body enough to keep a long time, if it lacks in flavor and bouquet, or if it is dry, harsh, and without fruity taste, etc. Most of these defects can be corrected, in case the soil is good, by using *the varieties which yield an excess of the quality which the wines that were made from the poor varieties have been lacking.*

VARIETIES PRODUCING HIGH-GRADE WINES.

The best red wine varieties which are cultivated in the Gironde are, according to their merit: (1) The *Carmenet*, or *Petite Vidure*, which is called in the Medoc *Cabernet-Sauvignon*, *Petite Vidure Firsée*; (2) *Gros Cabernet*,* of which there exists several varieties, often confounded with the *Carmenère*—many grape growers call these varieties *Grosse Vidure*; (3) the *Petit Verdot*; (4) *Gros Verdot*; (5) the *Malbec*, which is also called *Mauzac* and *Noir de Pressac*, and (6) the *Merleau*.

In second line stand the *Cruchinet*, the *Massoutet*, and the *Tarney*, which also yield good wines, but only when blended with the preceding varieties. The *Carmenets* or *Petite*, and *Grosse Vidure*, which are called in the Medoc *Cabernet-Sauvignon*, *Gros Cabernet*, as well as *Carmenère*, appear to be as their names indicate, three varieties of the same species. The *Carmenets* produce grapes and berries of medium size, which ripen at the same time as the majority of the other varieties; they yield a fine wine, which is highly flavored, and has a strong bouquet; the color is not deep; it undergoes changes in contact with the air less readily than wines which are made from other varieties.

The *Carmenère* has larger berries and yields an oily wine, which is deeper colored than that which is made from the *Carmenet*. In other respects, it shows the same qualities. These excellent varieties are the groundwork for the majority of the high-grade wines; several wine makers do not have any others in their vineyards, for they alone yield perfect wines.

The *Petit Verdot* and the *Gros Verdot* are two varieties of the same species. The *Petit Verdot* produces loose bunches with small berries; it ripens rather late; it is the latest of the varieties of the Gironde. In years when the *Verdot* ripens completely, the wine which is made from it has, besides a fine color, much body, much alcohol, and a fruity taste. The oily, mellow taste, which this wine from pure *Verdot* possesses, does not disappear with time—a rare quality, which is difficult to obtain, and which places it in the first rank; it shows also some harshness, which is due to the great quantity of tannin it contains, and which separates out in aging. The wines which are made from this variety improve slowly; they acquire gradually flavor and bouquet, and are the ones which keep the longest time, which stand long voyages better than any other wines, and which change the least in contact with the air. The *Gros Verdot* produces bunches with larger berries, which are also slow in ripening. The wine made from this variety keeps a long time, and has some of the good qualities of the *Petit Verdot*.

The *Malbec*, which is also called *Mauzac Noir de Pressac*, is a black grape and an early ripener; the wine possesses an agreeable flavor, the

* Known in California as Cabernet Franc.

color is deep, the taste mellow and fruity, but destitute of vigor; it is, therefore, not easy to preserve the wine in a good condition, particularly if it is stored in a cellar which is subjected to variations of temperature.

The *Merlot* and *Muscadet*, the *Tourney* are not cultivated for themselves alone; they are often mixed with the two *Vidures*. The *Merlot* yields, if taken separately, a wine which resembles the wine from the *Malbec*. Like the latter it has a decided fruity taste. The ripening of this variety is sometimes delayed; in rainy years these are frequently found on the same stock vine and green bunches together. The wine which is made from this variety is agreeable, rather dry, but destitute of vigor and poor in alcohol. It becomes rapidly acid if the necessary precautions to preserve it from contact with the air are not taken. This variety, in order to give good results, should be blended with other varieties which yield a strong, full-bodied wine, such as the *Vidure* and the *Verdot*.

The *Muscadet*, the *Couchemet*, and the *Tourney* are not very common; they occur generally together with the preceding varieties. They yield wines which have partly the same qualities as the wines made from the *Vidure*.

NATURE OF THE SOIL—CHOICE OF VARIETIES WHICH ARE SUITED TO PRODUCE GOOD WINES.

Our object is not to study the nature of soils which are adapted to the culture of the vine. Aside from that, as far as the Gironde is concerned, the vine grows in soils of very diversified character, from arid sand up to the alluvial marshes of the Garonne. We are going to speak here only of the improvement of the wine through the choice of the varieties according to the nature and the position of the soil. The truly practical work has to be made by the vine grower himself—we can give but the outlines and a general idea of it.

Let us first examine the defects of the ordinary wines of the Gironde. The ordinary wines have one, several, and sometimes all the defects which are enumerated below. Low alcohol-percentage, dull, leady color, slow clearing, loss of color after fining disagreeable, earthy taste, taste of stone, bitterness, harshness, roughness, astringency, tendency to become packed. On aging these wines lose the fruity taste which some of them could have and instead of improving, they become harsh and dry, and have no keeping qualities.

We have already said that the excellence of wines was due to the attention and labor which has been bestowed on them—the vinification, the choice of good varieties, the nature of the soil, and the wise treatment to the growth of the vine. On the other hand, there are obtained but inferior wines if the opposite conditions prevail—such as the neglect of the necessary precautions during vinification, the choice of the wrong varieties, and the poor nature of the soil.

The varieties which yield ordinary wines are the *Muscadé*, the *Tournefort*, the *Alliance*, the *Pérolé*, the *Pérolé*, and the *Grande Chassagne Noire*, the *Ciontat*, the *Pied de Perdrix*, the *Balonzat*, the *Jurancon*, etc.

Of all the defects of the ordinary wines, the worst are deficiency in alcohol and in body; these defects make it impossible to keep the wines good; and if the deficiency in alcohol is combined with a like deficiency in tannin, they cannot be long preserved from alteration. The cause of this defect should be looked for in the nature of a very fertile soil,

and in the use of varieties which yield an abundance of watery fruit. If these wines have been made from varieties which have grown on strong soils, or on alluvial loams, they can be improved by replacing a part of the varieties which yield grapes that are too poor in sugar by the *Verdot*, which is the variety par excellence of the marshy soils, and which imparts to the wine not only body, color, and strength, but also tannin, which is necessary to its conservation. If the soil is poor and composed of sand or of gravel, and if the site of the vineyard is on well exposed hillsides, the *Vidure* will give good results, particularly if care is taken to choose the best site for it.

The dull and leady color is often due to the lack of a sufficient quantity of tannin and of alcohol to precipitate the mucilaginous substances, the organic albumen, the soluble color, etc., which are in suspension. If more body is imparted to the wine, the clearing and stability of the color are facilitated. As far as the earthy taste is concerned, it depends essentially upon the soil. It is possible, however, to make it partly disappear, because not all varieties have the earthy taste in the same degree, even on the same soil. It has been observed that the wines which are made from the *Verdot* show this taste less prominently than the wines which are made from ordinary varieties, though they may have grown in the same soils. The taste of stems and the tendency to become pricked are due greatly to lack of precautions during vinification.

If a wine contains sufficient body and alcohol to keep a long time, it may at the same time be too rough, too harsh, too bitter; this is the case with certain wines which are grown on hillsides. It is possible to make this wine mellow and to impart to it the fruity taste which it is lacking by replacing a part of the vines by *Malbec* and *Merleau*. In one word, in the production of ordinary wines we should endeavor, if a wine does not contain enough alcohol, to give to it a convenient amount of body by the proper choice of varieties. In order to be able to keep a wine without undergoing changes it should contain about 10 per cent of alcohol; and if the wine contains naturally a sufficient amount of alcohol, but is rough, the endeavor should be made to make it mellow. Such a result can be obtained only with good varieties and by the use of good methods of vinification.

VINTAGE.—Grape growers desirous of making fine wines, which are not tart, should resolve to have their grapes picked only when they are perfectly ripe. It is a well known fact that the different varieties of the Gironde do not mature all at the same time, the conditions of the site and of the soil being the same. Thus the *Malbec*, the *Merlot* ripen earlier than the *Cabernet* (or the *Vidures*), and these again more so than the *Verdot*, etc. Therefore, the necessity arises of gathering the grapes several times. Besides the influence which the difference in the varieties, the age of vines, the locality, and in the nature of the soil exercise, the grapes of the same vine do not all reach at the same time an equal degree of maturity; the grapes which are the most exposed to the sun, those which are next to the stump and which are first reached by the sap, ripen earlier and contain more sugar than the grapes which are distant from the trunk and which are hidden by the leaves, or whose period of bloom was late.

This shows that the same varieties should be picked several times. First, the perfectly ripe grapes should be picked, and the rest should be allowed to mature on the stock. The proprietors of ordinary varieties

make the objection that the picking is more expensive if the grapes are picked from the same varieties at various times; and this is the motive, together with an insufficient supply of vessels for the purposes of vinification, which makes them gather the whole crop of grapes at once. They can avoid the increase of expense, by picking the grapes of each variety when they are completely matured, and then separating them from the green, dried, or rotten and overripe ones; the defective grapes should then be fermented separately and would make a second-class wine.

Complete maturity can be easily recognized by the deep, bluish color of the berries, by the color of the stems, by the softness of the skin, and particularly by the frank, sweet taste, and still easier by the specific gravity of the must.

When the grapes are not ripe the color of the berries is rather red than blue, the skin is still hard, and the taste is rather sourish than sweet. If picked at this stage of incomplete maturity, the grapes yield a wine which retains a tart taste, which is due to the excess of tartaric acid. There is also less deep color and less fineness of taste if the grapes are overripe and rotten. This is due to the fact that when the grapes are in this condition the skin is already partially destroyed. It is also the explanation of the lack of intensity of the color, which, as it is well known, has its seat in the skins of the grapes. Aside from that, wines which are made from such material have a taste which is less frank; they are sweetish, contain but little tannin, and do not keep well.

In hot years the picking may be carried on without inconvenience from sunrise to sunset. It is advisable to let the dew evaporate, in order not to dilute the must. After being picked, the grapes should be carried immediately to the press.

STEMMING.—Before pressing, the grapes should be stemmed, an operation which consists in separating the stems from the berries. For this purpose the grapes are spread on screens, which are placed on the press and are then moved about with the help of forks or of rakes. In this way the berries are detached from the stems and fall to the bottom of the press tank; the stems alone remain on the screen.

Before stemming, the workmen who attend to this, pick over the grapes a second time, and put aside the berries, or the bunches, which do not appear to them sound, and which have escaped the notice of the pickers.

The question as to whether stemming is useful or not, has for a long time divided viticulturists. It is certain that the presence of the stems gives increased activity to the fermentation. Nevertheless, the stems should not be present in the fermentation of fine wines, when the must already contains a sufficient quantity of ferments.

The stems consist of woody fibers; they contain ferments, juices, which hold in solution some of the substances which are contained in the grapes, tartar, tannin, a bitter substance, and various disagreeable tasting and smelling oils. If the stems contained only tartar, tannin, and the aromatic substances which are peculiar to the grapes, they would be useful in vinification, because they would give increased activity to the fermentation and would contribute to the preservation of the wine by increasing the quantity of tannin; but the fact that the above mentioned bitter and bad tasting substances dissolve in the must makes the presence of the stems in the vinification of fine wines quite inadmissible. These wines contain as a rule quite enough tannin to keep and clear them well, owing to the fact

that the pomace remains immersed in the must during fermentation. The stems should be allowed to ferment with the pomace only when the must is poor in sugar, or when the skins have been partially destroyed owing to overripeness. As in such cases the tannin is indispensable to the conservation of the wine, we should endeavor to increase its quantity.

In case of ordinary fermentations in open tanks, the wine makers crush into their tanks the bunches with the stems. Now, it is known that during fermentation a portion of the stems, skins, and seeds rise above the surface of the must and form the cap; as these substances are no longer immersed, they are consequently unable to impart color and tannin to the must; while, on the contrary, by keeping them constantly immersed in the must by the means of a frame, a much deeper color is obtained, with a great deal more tannin, and sometimes too much of it. By adopting this process, and by stemming only a portion of the grapes, it is possible to obtain mellow wines, which still contain a quantity of tannin sufficient for their conservation.

Often the taste of the stems is not due to the fact that the grapes have not been stemmed, but because the wine has remained too long in the fermenting tank. Several experiments which we have made in Southern France, and in Greece, have proved to us that by not stemming very sweet varieties the fermentation was more active. We have also noticed that under these conditions, and particularly *if the must did not contain enough ferments*, the wine which was made from stemmed grapes had less color and tannin than that which was fermented with the stems.

FOULAGE.—The foulage consists in crushing the grapes and in breaking the cells which contain the saccharine matter, the yeast, and the other constituents of the pulp.

This operation, which is very easy, is performed at the press by men with their naked feet or with wooden shoes.

In order that the crushing should be complete, the must is allowed to run off in proportion as it is formed in a small vessel under the tank, and the charge is again treaded until there remains nothing more in the tank but completely crushed skins and seeds. There have been devised several machines for crushing the grapes; few of the wine makers use them, because the crushing, particularly of stemmed and ripe grapes, is a very simple operation. Aside from that, these machines, which consist mainly of cylinders, *tear the berries without crushing them*. The must, as well as the skins and seeds, should be run immediately into the fermenting tank. When a charge is filled into a tank, it should be done as much as possible the same day, in order not to disturb the fermentation, when it has once started. The violent fermentation begins about eight to twelve hours after the must has been filled in, according to the surrounding temperature of the fermenting-room.

It has been noticed that the wines of the Medoc, which are made without the berries being crushed, have less color than those which are made from the same varieties when they are crushed, but that they possess distinctly a finer taste; therefore, in years when grapes reach their full maturity, the proprietors of the high quality (*grands crus*) vineyards do not have their grapes crushed. They perform this operation only in

NOTE.—It is preferable that the crushing should be done with naked feet, for thus the crushing of the seeds, which contain a bitter substance, is avoided; also, the trituration of the skins can be done more thoroughly with naked feet than with wooden shoes.

years when the grapes have not acquired a sufficient degree of maturity, and when they have reason to fear that the color of the wine will not be deep enough. If the stemmed grapes are fermented without having been previously crushed, there results a larger quantity of press wine, and often this wine has a sweetish taste. Mixing the latter with the rest of the wine should be avoided as much as possible, as it gives rise to secondary fermentations which destroy the mellow character of the wine.

FERMENTING TANKS.—The construction of the fermenting tanks has given rise to many discussions among the inventors who have discovered what practical people have already known for a long time. They have devised various fermenting tanks which, according to them, it is much more advantageous to use than the ordinary tanks. Most of these systems are given up to-day. The practical viticulturists know from experience that the fermentations in covered or in open tanks can give equally good results, if the fermentation is conducted with intelligence, and if the *murk* is drawn off at the proper time. The method of fermentation, however, which unites the most numerous advantages, and that which has been sanctioned by long practical experience and by the experiments of the oenologists, is the fermentation in covered tanks (the covers being luted to the tanks by means of plaster of Paris or of clay), with an inner frame, the gases being consequently under pressure. The advantages which this kind of fermentation offers, compared with that in open tanks, consist chiefly in the formation of a larger quantity of alcohol and in the superior fine and mellow taste.

The increase in the color is due to the complete and constant immersion of the skins, which produce a good deal more color under these circumstances than if they are carried up to the surface of the must. This happens in the ordinary fermentation in open tanks, owing to the formation of the cap.

The superiority of the taste and its velvety character are chiefly due to the compression of the gases and to the complete solution of the mucilaginous substances.

Most of the high quality red wines of the Medoc, the first crop Saint-Emilion, and the first crop Graves, are fermented in covered tanks. We say "most," because a certain number of wine makers follow yet the ancient custom of making their wine in open tanks.

DRAWING OFF THE MURK.—The fermentation does not go through every year in the same length of time; it is more rapid in hot years than in cold years, aside from the influence which the temperature of the must at the time of its leaving the press exercises—one which increases during fermentation. The use of open or of covered tanks, the density of the must, its composition, the temporary or constant immersion of the cap, or its remaining on the surface, the partial or complete stemming, all these circumstances have an influence on the duration of the fermentation. The fermentation, as a rule, goes through more rapidly, the must and the atmospheric conditions being the same, if open tanks are used, and if the stems are present, and if the cap remains immersed, than if the grapes are stemmed, and if the tank is covered, the cap being allowed to float on the surface of the mash.

That the fermentation is through can be recognized by the taste, if one has a great deal of experience; by the specific gravity of the must; by the temperature of the liquid, and its limpidness (when the liquid is

almost cold and clear). The fermentation is not completed if the liquid is warm, sweetish, and turbid.

The wine maker should be extremely careful to see that the violent fermentation is entirely completed in the fermenting tank. Wines which are still fermenting and sweetish should not be filled into barrels, nor should they be allowed to remain in the tank after the fermentation is over. In the first case, the wine remains a long time sweet in the barrel, and after its alcoholic fermentation is over there often remain in suspension ferments which make it difficult to fine and preserve without an after fermentation. They also make it liable to become acid. In the second case, if the tanks are open and no frames are used, the cap is liable to sink down and to impart to the wine acidity and a disagreeable taste of stems.

VINIFICATION OF THE INFERIOR VARIETIES.—Most of the proprietors of the ordinary varieties of the Gironde, and of the south of France, neglect the necessary precautions which should be taken during the critical period of fermentation. They have picked their grapes all at the same time, notwithstanding their vineyards are stocked with varieties which attain their full maturity at different periods; the result is that the grapes of the early ripening varieties are ripe and even partly rotten while others are still green. The must which is made from such material is never in the proper condition. The green berries give to the must an excess of tartaric acid, which imparts to the wine tartness; and the rotten berries, whose skin is partially destroyed, yield only a very small amount of coloring matter.

The grapes which have been picked in this condition are crushed without having been previously stemmed and are thrown into an open tank, in which they ferment more or less rapidly, according to the temperature of the surrounding air.

After the violent fermentation has well started (eight or twelve hours after the tank has been filled), the pomace is carried by the carbonic acid to the surface of the liquid, where it forms a crust called the *cap*.

When the tank is full the cap comes in immediate contact with the atmospheric air, by whose oxygen it becomes acidified, and with the progress of fermentation the surface of the cap passes from acidity to putridity.

When the tank is not quite full the carbonic acid gas is given off freely; but as its specific gravity is greater than that of the air, there remains naturally in the tank a layer which partly protects the cap from contact with the air.

When the fermentation is over, the cap, no longer held on the surface by the evolution of carbonic acid, sinks down in the liquid, and unless the latter is drawn off immediately imparts to it acidity, a bad taste, and even putridity. This happens particularly in years when the weather is very warm during vintage. The fermentation is then very rapid, and it may happen that it goes through in half of the time which is required in ordinary years. Notwithstanding this, negligent wine makers often allow their young wine to remain in the fermenting tank the same time as under ordinary conditions.

The wine makers who ferment their wines in open tanks, should, in order to avoid accidents, *watch attentively the proper time for drawing off the muck*: they should fill the tanks but to a height of twenty inches

from the top in the great tanks, and twelve inches in the small ones; the next day after filling the tank, they should cover the cap which begins to form, not with stems, which acidify too easily, but with a layer of straw, about eight inches thick.

There are wine makers who have the bad habit of filling their tanks not at once, but several times; and after the lapse of several days the first portion of the charge is in the state of violent fermentation, when they add some fresh must in order to fill the tank. They thus expose the wine to the danger of souring, interrupt the fermentation, and may make the wines sweetish or cause them to acquire a taste of stems, because they have remained too long a time in the fermenting tank. When the wine has been drawn off, the pomace remains in the tank. The wine which is contained in this pomace can be recovered by submitting it to the action of the press until nearly dry, after having taken the precaution to remove the upper crust of the cap which has become acid.

The wine thus obtained, which is called *press wine*, is very turbid, very harsh, and sometimes acid, particularly if the upper crust of the cap has not been well removed.

Most of the makers of ordinary wines follow the deplorable custom of mixing their press wines with the clear portion of the wine which has been drawn off from the fermenting tank without first clarifying it. They should put this wine aside, for by doing otherwise they make the best portion of their wine turbid and difficult to fine.

When the fermentation is conducted in closed vessels—aside from the superiority of the wine, there is no chance for the wine to become altered by the acidity of the cap, even if the fermentation should not be attentively watched; for, if the pomace is kept down by frames, the formation of a cap does not take place.

These precautions have a too great importance to be overlooked by the wine makers. To neglect them, one would have to be the enemy of his own interests.

THE VINIFICATION OF WHITE WINES.

GENERAL OBSERVATIONS.—The white grapes are pressed immediately after having been crushed. The must is poured directly into barrels or casks. The vinification of the white wines differs from that of red wines in this respect: that the must is entirely freed from the skins and seeds.

The fermentation starts in the barrels more or less rapidly according to the initial temperature of the must and of the fermenting-room, and according to the amount of saccharine matter contained in the liquid. As a rule the white wines are in violent fermentation twenty-four hours after the must has been filled into the barrels. The fermentation begins in the same way as with the red wines in tanks, by the evolution of bubbles of carbonic acid, which rise to the surface of the liquid and carry with them light matters (such as fragments of skins, woody substances, etc.), which they meet on their way. These various matters which form in the fermentation of red wines produce in the white wines a foam, which rises to the surface of the liquid, and is thrown out of the barrel through the bung-hole if care is taken to fill up with new must every day. In this way the wine is freed from a part of its lees, and of the superabundance of ferments. If the barrel is not full, the foam sinks back in the wine, the fermentation becomes more active, and a less mel-

low wine results than when the escape of the foam has been promoted by keeping the barrel full.

The rise in the temperature of the must is generally not so great in the fermentation of white wines in barrels as in that of red wines in tanks.

The decomposition of the saccharine matters, and their transformation into alcohol, require a much longer time than is the case with red wines, particularly if the must is rich in sugar; this fermentation lasts sometimes until the month of March. In order to facilitate the escape of the foam, and the irresistible evolution of carbonic acid during the violent fermentation, the bung-hole should be only covered by a chip of wood, or by vine leaves loaded with sand, when the fermentation becomes less active. Ultimately the bung is driven in loosely, as soon as no more foam escapes.

The barrels with white wine should be placed with the bung-hole up, and should be filled regularly every day when the fermentation is violent, and at least twice a week when the fermentation is less violent.

THE DIFFERENT VARIETIES OF WHITE WINE.—There are three species of white wine: (1) Dry white wines; (2) mellow white wines; (3) sweet white wines.

These differences are chiefly due to the density of the must.

The dry white wines are those whose alcoholic fermentation has been complete and whose entire saccharine matter, which could be recognized either by the taste or the saccharometer, has been transformed into alcohol.

These wines are fermented as soon as the grapes are perfectly ripe (without, however, allowing them to rot). The specific gravity of the must varies according to the more or less favorable weather, according to the site of the vineyard, and according to the varieties; but the maximum rises seldom above 13 degrees Baumé.

The mellow white wines are those which retain after the violent fermentation a small quantity of fruit sugar which is not transformed into alcohol. The small quantity of mucilaginous substances imparts to the wine the mellow and the oily taste. In order to obtain such a wine, it is necessary to increase the density of the must. In the Gironde this is done by allowing the white grapes to become mellow, and by picking them only when the skin has acquired a brownish tinge.

The density of the musts is from 12 to 15 degrees Baumé. Such is the specific gravity of the musts of the Sauterne, Barsac, Bommes, Presgneac, etc., in vintages favorable to the maturity of the grape crop. These wines stand between the dry and the sweet wines.

The sweet white wines are those which retain, after their alcoholic fermentation, a considerable quantity of saccharine matter, which makes them very sweet. It is important that the specific gravity of the must should be greater than that, which is necessary to obtain simply mellow wines; and in order that they should remain sweet on aging, the specific gravity should be from 15 degrees to 20 degrees Baumé.

VINIFICATION OF THE HIGH QUALITY WHITE WINES OF THE GIRONDE.

VARIETIES OF VINES.—The varieties which produce the high quality wines are the *Sauvignon* and the *Semillon*. There are some vineyards which are stocked with *Raisinotte*, or sweet *Muscadet*.

The Sauvignon.—This variety yields small bunches with small berries, which press one against the other; their musk taste is very fine. The wine which is obtained from this variety has much flavor and bouquet, and also a high alcohol-percentage.

The Semillon.—Bunches and berries of medium size; fine, mellow taste. The wine which this variety yields retains (the specific gravity of the musts being the same) more of a mellow taste than the *Sauvignon*; it soon becomes flat, however, and turns reddish if it has been allowed to remain in contact with the air.

These two varieties form the foundation of the high quality white wines. They combine the qualities which, taken together, make a perfect wine—fineness of taste, agreeable and decided flavor and bouquet, joined to a very mellow taste.

The Raisinotte (also called *Sweet Muscadet*).—This variety, which some grape growers of Barsac cultivate, together with the two first mentioned ones, yields bunches and berries of medium size, whose taste is similar to that of the Muscat and of the Sauvignon. When perfectly ripe the berries show brown spots; the skin, which is very thin, bursts very easily if rain happens to fall during the time of the vintage. The wine which is made from this variety shares the qualities of those which are made from the two above mentioned varieties.

The three varieties which we have described are the only ones which are actually grown in the vineyards producing the best wines. In former times some poorer varieties were raised, but at present they have been entirely discarded.

VARIETIES YIELDING SECOND-CLASS WINES.—The varieties enumerated below are frequently found with the varieties which we have already mentioned, particularly in the districts adjacent to Barsac and Sauternes. These varieties are: *Prueras*, *Malvoisie*, white *Verdot*, *Cruchinet*, white *Muscat*, golden *Chalosse*, or *Petite Chalosse*, *Enrageat*, called also *Pique-poule Folle-blanche* (which is very prolific), the *Blagnais*, the *Verdot gris*, the *Jurauncon*, and the *Grosse Chalosse*. These latter are prolific, but yield only ordinary wines.

PICKING THE GRAPES.—When the grapes are overripe, and have reached a convenient stage of desiccation, the vintage may begin. The picking should be done only by degrees, sorting as we go. First, the overripe and sufficiently dry berries are picked. It often happens that a portion of the bunch, the one which is turned toward the south, and which is consequently most exposed to the sun, is already overripe, while the side which faces the north is not yet ripe. In this case, berry after berry is picked, and the berries which are not yet overripe are left on the stem.

A second picking is done as soon as there is a convenient quantity of overripe or dry bunches and berries. The number of times which the picking may be repeated is indefinite; this depends upon the temperature, upon the weather being dry or rainy, and upon the more or less favorable site of the vineyard. When the temperature is favorable the grapes are picked at least three times. When it is cold and very moist—in order not to lose the whole crop—it is necessary to pick the grapes not only before they are overripe, but also some time before they are at all ripe; for the humidity, by dilating and bursting the skin, exposes the fleshy and liquid part of the berries to the contact of the air. Under

such conditions these berries begin to ferment and pass rapidly from alcoholic fermentation to acidity, and even to putridity, particularly if the rain continues.

It is necessary in unfavorable years to watch the crop attentively, and to detach the spoiled berries, in order to prevent the contagion from spreading. But, anyhow, too great haste should not be made in harvesting the crop; a sudden change in the temperature may occur; it may stop raining; in a word, the grape grower should not sacrifice the quality of the crop except when there is no hope of obtaining any, and when the crop threatens to become a total loss.

FILLING THE MUST INTO BARRELS.—The precautions and manipulations in washing the press are the same as for the red wines, with the exception that the sponging is done with water, and not with alcohol.

The barrels destined to be filled with wine should be prepared in advance. This preparation consists of washing them with boiling water; rinse them afterwards and let them drain.

The must should be poured in not later than the evening of the day when the pressing is done; the barrels to be filled up to two inches from the bung-hole, in order to leave only the necessary space for expansion, which is produced by fermentation. As soon as the foam appears the next day on the surface, some must should be added, in order to remove the foam from the barrel, and thus to free the wine from a portion of its natural ferments.

VARIOUS PROCEEDINGS TO AUGMENT THE DENSITY OF THE MUSTS.—In the following are given various means of increasing the density of musts from white or red grapes, with the object of making sweet or mellow wines, without using saccharine matters foreign to the grape. The processes which we are going to describe are particularly used in cold countries—in Germany, etc.—either for making sweet wines or simply for improving the ordinary wines. These additions make them mellow—destroy the tartaric acid, which the green grapes contain in excess.

Sweet wines may be made where the density of the must is higher than 25 per cent. Below 25 per cent the wines do not remain sweet; it is, besides, very easy to regulate the density which it is desired to obtain by preliminary experiments.

These processes should be used only in case when it is impossible to increase the density by the solar heat in a natural way, or if the varieties ripen slowly, or if they have a thick skin. They are consequently used but for the improvement of ordinary wines.

1. The grapes are picked as ripe as possible; the spoiled berries are sorted out, and the rest exposed to the sun on straw or on boards during several days. At night they are stored in dry and well ventilated garrets.

2. If the weather is rainy, or if it is cold, the solar heat may be replaced by the heat of a furnace. For this purpose the grape bunches are placed on screens and introduced in a baking furnace after the bread has been taken out. The desiccation is stopped after the density has been conveniently increased by the volatilization of a part of the water, and by the transformation of the tartaric acid into glucose.

As far as the increase of the density by a foreign saccharine matter is concerned, aside from the expense caused by these operations and the

bad taste imparted to the liquid, we disapprove of their use; they do not fulfill their aim. We speak now of the ordinary wines of cold countries, where the grapes do not easily reach their maturity, and where they contain an excess of tartaric acid. The heat, as is well known, transforms this acid into glucose (fruit sugar), which imparts the tart taste to the wine. In the absence of natural heat, artificial heat accomplishes the same purpose. Sugar or syrup are only used to increase the density of sweet wines from the south of France of ordinary quality. The introduction of a certain quantity of candy syrup into musts showing a low density, produces, it is true, a mellow wine without bad taste; but this sweet taste is insipid, and has nothing in common with the taste known as "*rôti*," so called by Frenchmen. Only the sun can produce this, and it makes the white wines of the Gironde stand without rivals in the world. Besides, if syrup is added to wines which are already fermented, it is necessary to fortify them so as to give them 15 to 16 per cent of alcohol; because otherwise they could not be preserved under the ordinary conditions without fermenting and becoming turbid.

PART II.—WINES, THEIR CARE AND TREATMENT IN THE CELLAR AND STORE.

CHAPTER I.

GENERAL TREATMENT OF WINES.

General remarks. Influence of contact with the air. Influence of the variations of temperature. Influence of the deposition of the ferments, and of the lees; measures by which a sudden spoiling of the wine can be avoided. Suitable premises for storing wines; cellars, store-rooms, etc. Precautions which should be taken to avoid the loss by evaporation, and to maintain a regular temperature in the cellars; ventilators; difference between the loss by evaporation in a ventilated and in an air-tight cellar. Humidity; methods of diminishing the same. Arrangement of frames and supports for casks; materials suitable for the purpose. The piling up of the casks; utensils and apparatus; Bordeaux method. The piling up of casks in the warehouses of Paris. Machines for piling up. Racking of the wine; utility and various objects of racking; most favorable conditions of time and of temperature for racking. How to do the racking; Bordeaux method. Cleanliness. Macon method. Transfer of wines from one barrel to the other; various systems of pumps, syphons, etc., for racking. Sulphurous acid gas; its nature and properties; its use in the treatment of wines. Sulphur wicks; their manufacture, etc.

GENERAL REMARKS.—The care and attention which should be bestowed upon wine making includes not only the manipulations which are necessary to keep the wines in a good and sound condition, but also the means necessary to promote their aging, by developing in them all the qualities which they are capable of acquiring. It comprises also the remedies against the diseases or defects to which they are subject. Three important conditions should be fulfilled in order to reach this end:

1. The wine should be preserved from contact with the air.
2. The wine should be maintained at a uniform temperature.
3. The wine should be freed from the ferments and lees, and its complete clarification obtained without injury to its future development.

Aside from these precautions of a general character, it is very important to taste and to watch continuously the progress of the wine, in order

to prevent by the proper measures after-fermentations, which originate particularly in mellow wines, and which, by transforming the mucilaginous substances into alcohol, destroy the fruity taste. The details of these measures will be given on each occasion, when speaking of the particular treatments which are adapted to each kind of wine.

The remarks which follow are applicable to all *natural* table wines—that is, to unfortified wines. These wines contain from 7 per cent to 15 per cent of alcohol, according to the climate and variety of the grape. We reserve a special chapter for the liqueur and sweet wines, as the conditions which should be observed to preserve them in a sound state are different.

INFLUENCE OF CONTACT WITH THE AIR.—If the wine is allowed to come in immediate contact with the air, several changes occur in its condition. A part of the alcohol evaporates as well as the bouquet and the flavor, and if the contact is a prolonged one a whitish scum called “flowers” is formed on the surface of the liquid. These “flowers” are nothing else but mold of a peculiar nature, which is produced by the growth of microscopical fungi, called *Mycoderma vini* and *Mycoderma aceti*, and which develop rapidly by budding.

This mold, which is impregnated with acidity, communicates to the wine a disagreeable taste, known under the name of *flatness*; it also renders the wine turbid and introduces acid ferments in the same. Sometimes when the wine contains an appreciable quantity of sugar this mold will not thrive, but then the wine undergoes an alcoholic after-fermentation. If not speedily protected from the contact with air, it will become pricked, and will be transformed later into vinegar. Science explains this transformation of wine into vinegar by the action of the oxygen of the air, which, oxidizing the alcohol, changes the same into acetic acid. All the alcoholic liquors are susceptible of undergoing acetic fermentation on coming in contact with air, water, and a ferment. It is also known that most wines contain ferments. According to M. Pasteur, the acidity is due to a special ferment—the *Mycoderma aceti*. However this may be, the wine can be transformed into vinegar more or less rapidly and completely (and often without the mold appearing on the surface) at temperature ranging from 32 degrees to 212 degrees, but the temperature which most actively hastens this transformation is between 77 degrees and 104 degrees Fahrenheit. The alcohol which is contained in the wine changes gradually into acetic acid.

The vinegar which is allowed to remain in contact with the air loses its strength in its turn, excepting in cases where there is still a certain amount of sound wine present; the acid is by and by destroyed, and at last the liquid becomes entirely spoiled or rotten. On the whole, wines to which the air has access can undergo three different fermentations: The alcoholic after-fermentation—which is often termed in the business “the working”—changes into alcohol the different mucilaginous substances which are contained in the wine. This fermentation will proceed, if it has once started, without the air having access. Sometimes this fermentation is very injurious to the future of the wine, as it destroys the fruity taste. We shall have an opportunity to speak of this subject later.

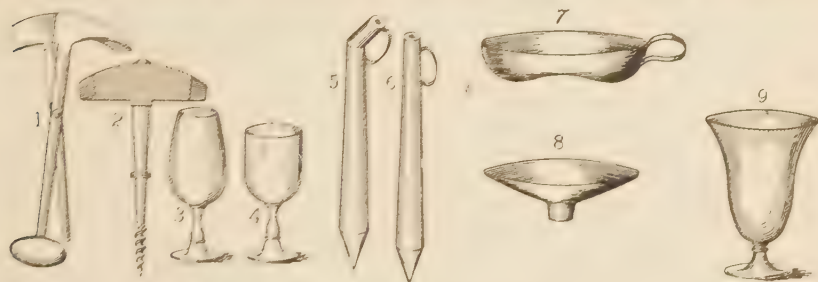
The acetic fermentation transforms the alcohol of the wine into acetic acid, and the wine thus becomes vinegar.

The putrid fermentation is, as its name indicates, a decomposition of the acid. At this stage neither the taste of wine nor of vinegar can be recognized; it is nothing but a spoiled liquid.

These different transformations may take place in wines of every quality, whose alcohol-percentages are below sixteen, if they remain exposed to the air.

Wines whose alcohol-percentage is a very low one become putrid and decompose without a preliminary acetic fermentation. The reason for that must be assigned to their relative weakness; as they contain but little alcohol, they can yield but little acid.

As far as the liqueur wines—for instance, port, Malaga, Alicante, etc.—are concerned, two agents retard their transformation under the influence of the air; the quantity of alcohol which exceeds 16 per cent, together with the large quantity of sugar, which several varieties contain, keep up in them, if the air has access, a slow fermentation, which, by transforming a part of the mucilaginous substance into alcohol, stops and often even prevents the beginning of the acetic fermentation. Their high alcoholic percentage, which is very often increased by the addition of alcohol, retards the alcoholic fermentation and prevents putrefaction.



IMPLEMENTS FOR TASTING.

1. Hammer: for using in tasting. This tool is used to make gimlet holes by means of the nail, which is screwed onto the extremity of the handle *c*; *a* serves for pinchers with which to take out the plugs, and may be used as a hammer and the sharp side for cutting plugs.

2. Gimlet, such as used in Macon.

3. Crystal glass for tasting old wines with considerable bouquet.

4. Ordinary tasting glass.

5. Pocket thief of silver or tin.

6. The same in glass.

7. Silver cup, Macon pattern.

8. Silver cup, Bordeaux pattern.

9. Graduated measure of glass.

These wines, however, are not always exempt from changes under the influence of the air. Their alcohol-percentage and their bouquet decreases; an alcoholic fermentation sets in which destroys their sugar, and this loss, combined with the decrease in alcohol, favors a rapid setting in of the acetic fermentation; it happens even often that the presence of the acid shows itself plainly before all the sugar is changed into alcohol.

The wine can be considered protected from the immediate contact with the air, if the barrels are made of sufficiently thick and well-fitting staves, and if neither porous nor dripping wood has been used for this purpose. It is necessary, besides, that the casks should be completely filled and well bunged.

On the contrary, the wine can be considered to be in contact with the air if the barrels are not completely filled, if they are not carefully bunged, or if they have leaks.

INFLUENCE OF A VARYING TEMPERATURE.

It is important that the premises in which the wine is stored should have a constant temperature. In our climate, the average temperature of the cellars is from 59 to 62 degrees, but these variations of temperature depend upon a more or less favorable location, and upon the precautions which are taken to prevent the access of the air. We shall speak a little later of the places which it is most advisable to choose for this purpose. The variations of temperature produce in the wine, in the same way as in other liquids, changes of density and of volume—a lowering of the temperature produces contraction of the liquid; a rising, on the contrary, an expansion. Thus, if a barrel is completely filled with wine and placed in a cellar, the temperature of which is lower than that of the wine, the wine will decrease in volume, and an empty space in the cask will appear. In most instances, this contraction is favorable to the deposition of the lees, but it has the disadvantage that it produces in the casks an empty space, which often results in the drying up of the exterior surface of the staves, and thus affords a passage to the air.

In this case it is necessary either to fill the cask or to draw off the wine in order to preserve it from contact with the air.

When the temperature of the store-room is higher than that of the wine, the latter will expand. In addition to the danger which results in leaving the wine in such a condition, on account of the pressure it will exert against the staves and against the bottom, the expansion may produce a rising of the lees which had been already deposited, and thus render the wine turbid, and impart to it the bad taste of the lees; besides all that, such an expansion will predispose the wine to all kinds of after-fermentations.

INFLUENCE OF THE SETTLING OF THE FERMENTS AND OF THE LEES; MEASURES BY WHICH SUDDEN SPOILING OF THE WINE CAN BE AVOIDED.

The importance of settling the ferments and the lees is acknowledged; the turbid wines are liable to undergo an after-fermentation, which may be either an alcoholic or an acetic one; they easily acquire the bad taste of the lees, a certain bitterness, etc. In all wines a continuous separating out of insoluble matters is going on; certain matters, among them the coloring matters, several mineral and organic salts, etc., which at first were dissolved in the wine, become insoluble, and form a precipitate at the bottom of the barrel, or remain in suspension; these are the matters which, together with the ferments, form the lees. There is more or less of this deposit in a wine, according to its character, and according to the care which has been bestowed on the same during vinification. The most voluminous deposits are formed in the first year; they decrease in volume and in consistence at every racking, if the wine is carefully treated. When the wine is well nigh free from them, and when it has reached its full development, the deposits amount to almost nothing, but they increase anew if the wine begins to deteriorate.

The deterioration of the wine can be prevented by bottling it before it has lost in the barrel a portion of its alcohol and its fruity taste. Bottled wine, as a rule, keeps well and improves in quality, while if the same wines be left in the barrel they become harsh and dry and lose their flavor, and consequently their full value.

Wines are freed from their deposits and ferments by different means, according to circumstances: by allowing them to settle slowly, by lowering the temperature, by racking, and by treatment with finings. We shall give further on the practical details of these different operations.

THE STORAGE OF WINES—CELLARS, STORE-ROOMS, ETC.

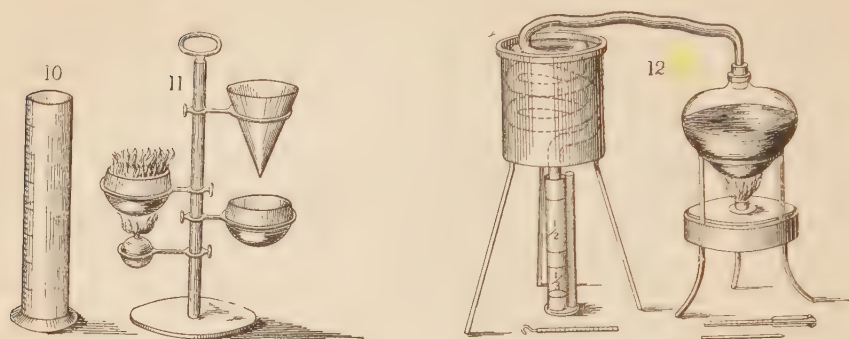
A wine cellar should combine two essential conditions: uniformity and regularity of temperature at all seasons; further, the loss which is produced by evaporation should be as small as possible in a good cellar.

In former times, a third condition was indispensable; it was necessary to avoid the humidity, which, by causing the wooden hoops of the casks to rot rapidly, often gave rise to loss of wine. For this reason the cellars were ventilated by air-holes. Through these openings the air could be constantly renewed, and thus the excess of humidity was got rid of, but the evaporation was thereby considerably increased, and the maintaining of a regular temperature rendered impossible. In those days the casks had wooden hoops only, and it was necessary to watch carefully their exterior surface. In some air-tight cellars they rotted in less than six months. To-day the custom of hooping the casks exclusively with iron has become general, and proves not only more economical than the ancient one, but it is also indispensable for the security of the wines which are destined to age, and which are placed in close cellars. Thus, while checking the humidity of the cellar by appropriate means (which we will mention later on), it is necessary to make the cellars perfectly close, and without direct communication with the outside; vertical ventilators which close hermetically are admissible.

PRECAUTIONS WHICH SHOULD BE TAKEN TO AVOID THE LOSS BY EVAPORATION AND TO MAINTAIN A REGULAR TEMPERATURE IN THE CELLARS. VENTILATORS; DIFFERENCE BETWEEN THE LOSS BY EVAPORATION IN A VENTILATED AND IN AN AIR-TIGHT CELLAR.

The cellars should be exposed as much as is necessary to the north, and should be protected on the south side either by adjacent buildings or by thick walls. The best cellars are those which are dug out of the ground or excavated to the depth of one to three feet, but this only in cases where the subsoil is not too moist. If the cellars are built as above, it will be necessary to surround them by trees, in order to protect them from the heat. Then they should have no permanent communication whatsoever with the surrounding air, neither by windows nor by air-holes; all the openings of this kind should be shut and the ceilings be plastered.

It is important that the cellar should have but one outlet—the door—exposed to the north, if possible. There should be, besides, at the entrance, one or two smaller rooms, which can be utilized as workshops, or as temporary store-rooms. These rooms should have double doors, which should be kept closed, particularly when the weather is warm. The lofts



COMMERCIAL ANALYSIS.

10. Graduated cylinder, holding one liter.

11. Small apparatus for evaporating and filtering liquids according to the system of Guyton-Morvaux. It is used advantageously for ascertaining the nature of the salts, saccharine matters, and residues which liquids contain; also, for filtering samples.

12. Distilling apparatus of Salleron, ancient pattern.

above the cellars should be plastered, and during warm weather ventilated, particularly in large establishments. Ventilators are useful for lowering the temperature of the lofts and of the *warm cellars*. It is the best plan to give them the same form as to those of steamships; they should rise above the roof for at least three feet and be topped off by a vane, which should be soldered on above the air-hole. This vane should be movable, and arranged to present the opening to the wind. If it is necessary to lower the temperature of the cellar, an hour ought to be chosen when the temperature of the surrounding air is at its lowest point. It is best to open the valves of the ventilators in summer at about three or four o'clock in the morning, and to close them at six o'clock, after having watered the floor abundantly. If the lofts are not plastered, all the seams between the boards should be calked. Aside from that, these lofts should be always filled with various merchandise, boxes, timber, etc., in order to prevent the access of hot air to the cave, else it will be advisable to cover the floor with a layer of fine and dry sand.

As far as the cellars with garret windows, which do not have a loft, are concerned, it cannot be expected that a regular temperature could be maintained in them, even if they are plastered, as the heat penetrates through the roof. The most convenient place for storing wine is a vaulted cellar, which has no direct communication with the surrounding air.

If it is desirable to maintain a regular temperature in cellars which have been constructed in former times, the best way to reach the desired end will be to do away with the air-holes, particularly with those which contribute towards producing draughts; further, by adding a new room at the entrance, by plastering the ceilings, and by constructing the lofts in the manner described above. If, during the great summer heat, the temperature of the cellar rises, which should be always ascertained by a thermometer, it can be lowered several degrees by watering the soil with fresh water at about 60 degrees, and by keeping the cellar well closed afterwards; but if the heat penetrates through the lofts or through the spaces between the boards, the casks must be placed as near as possible to the ground. As a matter of fact, in this kind of cellar there

has often been observed a difference of 20 degrees between the temperature near the surface of the soil and near the ceiling. Thus, on warm days it is not infrequently observed that the temperature in the neighborhood of the ceiling rises as high as 86 degrees, while that near the soil is not higher than 64 degrees. This fact explains itself by the expansion of the warm air, which, being specifically lighter, remains in the upper parts of the cellar.

The loss of wine by evaporation depends essentially upon the manner in which the store-room and the casks are arranged. The loss varies from 3 to 10 per cent, according to the ventilation of the cellar. The laws of France in the dealings of the wholesale merchants recognize, in bonding, an allowance of 8 per cent per annum. In dry cellars, where the air is constantly renewed through air-holes, through the windows, or through the garrets, evaporation attains the limits which are allowed by the law, and even goes beyond, particularly if the wines are kept in barrels with thin staves, barrels which are not well built, and hooped with wood or hoops which they have neglected to drive down. When the hoops become dry, the waste may reach 10 per cent—extraordinary leakage. In cellars which are perfectly air-tight, and particularly in those which are vaulted, the wines which are kept in strong and iron-hooped barrels show hardly a loss by evaporation of 3 per cent per annum.

The cellars of many of the wine makers of the Gironde, and generally also of other wine-growing countries, are in a poor condition for storing wines and for preventing loss by evaporation. Indeed, with the exception of the proprietors of the celebrated vineyards of the Medoc, where it is very important to treat their wines carefully and to reduce to a minimum the loss by evaporation, the cellars of the producers are, in most instances, nothing but barns, in which the air circulates freely, and whose temperature varies, in accordance with the temperature outdoors. Very few of these buildings have either a ceiling or are plastered, and the racking, filling up, and tasting are done with the doors and windows open—all done to economize light, and to avoid that rotting of the staves of casks (which are hooped with wood) which would take place under the influence of darkness and humidity.

Wine makers should consider that by allowing the free circulation of air in their cellars they lose every year, through evaporation, 3 or 4 per cent of their vintage, to say nothing of the difficulty they experience in selling their old wines, owing to the faults which they acquire through the contact with the air and carelessness. These faults are *dryness, acidity, harshness, etc.*

The decrease in the loss by evaporation would pay them largely for the cost of renewing the wooden hoops, and their wines would have a greater value if the cellars were conveniently built and perfectly close. They may avoid the expense of renewing the wooden hoops by using iron hoops.

In former times the difference in the value between the wooden and iron hooped barrels was great—the price of the wooden hoop was low, and that of the iron hoop high; but to-day the wooden hoop becomes more and more scarce, and its price shows an upward tendency, while that of the iron hoop remains stationary.

If there is good reason for not having the cellars close, as, for instance, where the wines are temporarily stored in magazines, sheds, etc., it is

impossible to avoid the loss by evaporation, but it is possible to prevent injurious changes in the wine. Keep the casks always well filled. The filling up should be done every five days, and if the wines are new, they should be permanently bunged. After-fermentations can be prevented by frequent rackings. If the wines cannot be racked, they should be transferred into sulphured casks, without bringing them in contact with the air. They should be often tasted, in order to ascertain if any working is going on in them. If the casks are entirely exposed to the air, they should be covered with tarpaulins, which should, in turn, be frequently wetted.

The same precautions should be taken with old wines; they should be drawn off as soon as the barrel shows a quart or more of ullage.

HUMIDITY—MEANS OF DIMINISHING THE SAME.

Humidity is unavoidable in close cellars. An amount of moisture, not too great, is useful, because it reduces the evaporation of the wine; but too much humidity promotes the rotting, not only of the wooden hoops perhaps, but also of the casks themselves. An excess of moisture is corrected by the following means: The soil of the cellars should be kept clean and well beaten, and thus be made almost impervious; this precaution is indispensable in order to avoid the humid and sometimes putrid emanations of the earth.

If the cellar is built in a marshy place there should be taken off from the surface of the soil a layer of earth about one foot thick, which should be replaced either by pulverized soft rock, by a mixture of lime, sand, and fine gravel, by clay mixed with pebbles, or by the waste from iron works, fragments of iron, and charcoal, which are well beaten into the soil so as to form an impervious layer. These compositions are allowed to dry, and if the moisture which they exhale during drying is too abundant, the drying is hastened by means of a chafing dish. When the soil has well hardened it is covered with a layer of fine and siliceous sand, which has been previously dried in the sun.

If, notwithstanding these precautions, infiltration of water should take place, all the parts of the cellar where this has been noticed should be laid out with stone fragments or bricks, and cemented with concrete.

There should never be left in the cellar any kind of matter susceptible of attack by humidity; for if such a matter is once impregnated with moisture it contributes to make the cellar still moister. Besides this inconvenience, the matter is apt to decompose under the influence of putrid fermentation.

The excess of moisture may be diminished by sweeping the soil of the cellar often, by scraping off the moss and the mold from the walls, by brushing off at every racking the mold from the casks, by taking away the moist sand which covers the soil below and between the casks, and by replacing it with dry sand.

Sawdust should never be used for replacing the sand with which the soil is covered, because if it remains there a long time it becomes impregnated with humidity, and increases the latter; but the greatest inconvenience connected with the use of sawdust is, that in this substance, as well as in all the woody and vegetable matters under the influence of the air and of humidity, a putrid fermentation is produced, which pol-

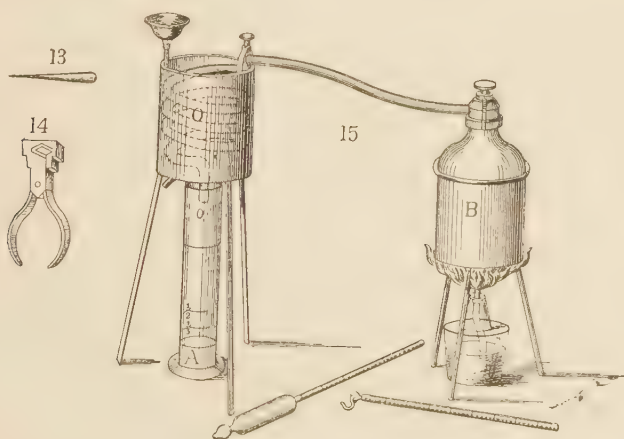
lutes the air, sets the wines fermenting, and, later, transforms the saw-dust into manure.

Preference should be, therefore, given to fine siliceous sand, which has been previously well dried.

ARRANGEMENT OF FRAMES AND SUPPORTS FOR CASKS—MATERIALS SUITABLE FOR THE PURPOSE.

The supports are wooden timbers or other material, which are laid on the soil, being from six to eight inches high. The skids are destined to support the barrels in order to protect them from the humidity of the soil, also to facilitate the racking of the wine.

They may be made from different materials. In the country around Bordeaux blocks of wood from the *Pinus maritima* are generally used, for the sake of economy. These blocks are nothing else but young trees, which are roughly squared, of a diameter of six inches, and of varying length (eighteen feet on the average). In order to form a bench, two of these trees are laid on the earth, leaving a distance of two and two tenths feet between them (from outside to outside), if they are destined for Bordeaux barrels, or any other barrels of the same length. If the barrels exceed this length it will be necessary to increase the distance between the blocks in the same proportion. The blocks from pine wood are usually not connected by cross framing; when they are placed on the floor of the cellar they should be exactly level, and if some part of the block shows a protuberance, it should be sawed from below half of its thickness, so as to be brought nearer to the floor under the weight of the full barrels.



13. Ordinary plug for stopping up sample holes.
 14. Pinchers (Maconese style) for withdrawing the plug.
 15. Distilling apparatus of Salleron (new pattern); *C*, copper cucurbit; *O*, cooler; *A*, test tube used as receiver—used same as ancient pattern.

If blocks cannot be made profitably from pine wood, fir or any other soft wood may be used, which is simply squared. If the joists are cut more high than broad (six inches high by four inches broad, for instance), they should be connected by crossbeams, in order to prevent

their upsetting. It is advisable to use hard wood for the frame, such as oak, elm, etc., which resist rotting better and longer, but their high price is an obstacle to their use. In very moist cellars, however, there is no economy in using pine wood, for they rot very rapidly. It is more profitable in this case to build them of hard stone, which are sunk into the soil to a depth of about twelve inches, and which have above the soil the same dimensions as those made from wood; that is, a height of six inches and a width of six inches. The contact of the casks with the stones is avoided by covering the latter with a piece of wooden board. These frames are more expensive than those which consist of blocks of pine wood, but they are very solid, and cost less in the end. Their use makes the renewing unnecessary, which in moist caves has to be done sometimes every year.

We have already said that the blocks or timbers should be placed at a distance of about two feet from outside to outside, in order to support one row of *Bordeaux* barrels; the average length of these barrels being about three feet, it is reckoned that each row occupies in breadth a little more than three feet.

The passages between the rows, which are necessary for racking, rolling, etc., for attending to the *Bordeaux* barrels or to barrels of the same dimensions, should have the following dimensions, as far as their breadth is concerned:

Passages in which barrels can be rolled freely	4 feet.
Passages in which barrels can be rolled without passing	3½ feet.
Passages for persons only	2½ feet.

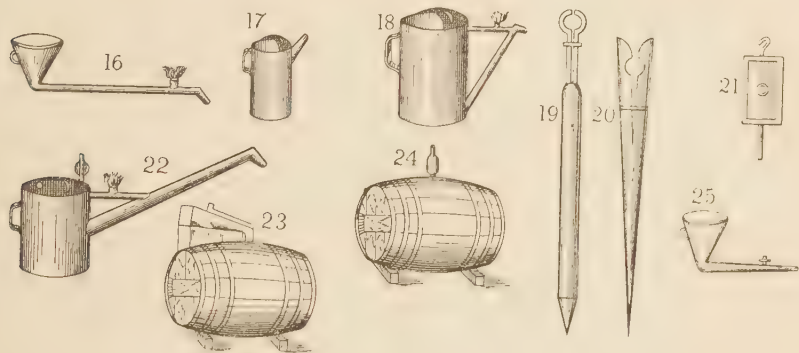
The work is done much easier, and consequently more economically, if all passages of a cellar have the breadth which is necessary for rolling, and in such a case, indeed, it is sometimes possible to place all the barrels which have to be rolled in the passages, leaving a space of eighty to one hundred inches; which allows the workmen to circulate between the rows of barrels and to carry on with ease the movements of rolling, fixing, etc.

This is the most advantageous arrangement for doing the work.

The number of barrels which a cellar can contain is reckoned from its length and breadth; we know that the *Bordeaux* barrel occupies three feet four inches in length and two feet two inches in diameter, and that the passages have to be from two and two thirds to four feet wide; therefore, it is easy to calculate the capacity of a cellar, without measuring row after row. The supports are arranged in two manners: In the cellars of the wine makers the rows are laid out in the longitudinal sense, while in the cellars of the wine merchant, and particularly if stock consists of a great variety of brands, they are laid out in the transversal sense to facilitate attending to the barrels.

If the rows are laid out in the longitudinal sense, first, one layer is formed from one end to the other of the cellar, on each side of the walls; then either one row is established in the middle, and the two ends of this row are left empty for facilitating the circulation, or several rows with passages between them, according to the dimensions of the cellar. In cellars which are very long, passages are made with a view to avoiding too long turns towards the middle of the row. This is the most frequent arrangement of the cellars of wine makers. In the cellars which are destined for the trade, one broad passage, six and one half feet wide,

is left on the whole extension of one of the walls, and the rows and passages are laid out perpendicularly to this broad passage; all passages end in the large passage, and all the rows rest against the other walls.



16. Z-shaped funnel, for ulling barrels placed in tiers.
17. Ulling can, containing from one half to one gallon, used to feed the Z funnel.
18. Tin can used for ulling. Usually it has on the inside a scale showing contents.
19. Iron candlestick, pointed at lower end, to be stuck into the wall, handle flat, to stand upright on barrel when necessary.
20. Wooden candlestick, made from large hoop, whose one end is sharpened for same purposes as iron candlestick.
21. Cellar candlestick used in north of France, with hook to hang to the crossbars of the barrels.
22. New filling pot, used instead of old Z funnel.
23. This instrument is filled with wine through a tube in the cover, which is afterwards closed by cork stopper; the air is allowed to enter through a small aperture below the spout, and which does its work as long as there is an empty space in the barrel. As soon as the barrel is full the opening below the nose is covered with the liquid, and the outflow stops; this effects a great saving, and reduces the loss so often occurring with unskilled labor.
24. Ulling bottle in inclined position, called *automatic uller* (system of Chaume).
25. Ulling bottle in vertical position, being a bottle with two necks; the lower one is conical, to fill the bung-hole; the other one is an ordinary bottle neck, through which the wine destined for ulling is poured; then this bottle is closed with a conical stopper, after fitting to the bung, by wrapping the lower socket with linen or india-rubber; as the barrel gets filled, the wine in the bottle sinks down. The uller (23) is more complicated on account of its inclined position; the air from the barrel being led into the upper part of the bottle through an india-rubber or glass tube, which dips one end into the opening of the bung-hole.
25. Z funnel, with stopcock. This instrument renders great services for filling barrels which are placed with the bung-hole sidewise.

To facilitate the finding of certain packages, and the making of inventories, each row should bear a number which is inscribed on a board in the great passage, on the wall opposite to the row. This board should show, besides, the date of the entry of the wines, and the quantities which are in each row.

In the cellars of ancient construction, or in buildings which it is impossible to modify, the rows should be laid out in such a way as to utilize in the best way the existing space without interfering with the necessary work around the barrels. At any rate, it would not be prudent to do away with the passages with the object of storing a greater number of barrels; this causes greater loss, particularly if the barrels are badly placed, for, if it would not be possible to inspect them, it would be also impossible to see the leaks, to stop these leaks, and to pump the wine from one barrel into the other when such operations are necessary.

PILING UP CASKS—UTENSILS AND APPARATUS—BORDEAUX METHOD.

The piling up of the casks consists in their stowage on the supports. The casks should be placed firmly so as not to incline forwards or backwards. They are kept in their place by means of blocks of wood shaped in the form of wedges. These blocks are made usually in Bordeaux from clippings of timber employed in the manufacture of barrels; in certain localities in which wood is dear, for instance in Paris, the wooden wedges are replaced by fragments of hard rock.

The barrels which are in the lowest row should rest on four wedges, two in front and two behind, in order to avoid a displacement which would impair the stability of the row, and which would stir up the lees. This would happen without the slightest doubt if the row should be racked in a direction opposite to its placement, and if it should be supported by wedges only from one side. The last barrel in the lowest row should be supported, besides the four usual wedges, by a great triangularly shaped stone, or by a piece of wood of the same shape, which should rest against the bulge. It is important that this last wedge should not go beyond the diameter of the bulge of the barrel; for otherwise one would run the risk in passing through the passages of displacing the wedge and endanger thus the stability of the rows, particularly if they are piled four or five high.

The barrels are piled up to a second, third, and higher rows with the help of wooden bridges. The barrels of these new rows should be supported with blocks with the same care as those of the first row; they are rolled from one end of the row to the other on skids in the same direction as the frames. The skids which are destined for this use are two feet two inches wide (approximately the diameter of the bulge of the Bordeaux barrel), and they are placed without blocks on the barrels which are stored in the first row. Care should be taken that they be firmly bolted together to avoid their spreading. In order that the piling up should be executed quickly, and to diminish the labor of the working man who manages the crowbar, it is necessary, according to the case, that the barrels should arrive on their place either with the bunghole upwards or sidewise.

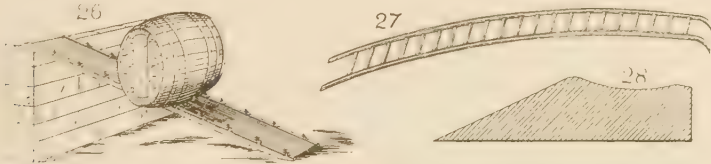
To attain this result they should be measured before hoisting them up.

The utensils and apparatus which are necessary for the piling up of the barrels are: (1) an iron crowbar which is bent on one end and sharpened on the other; this instrument should have a length of two feet eight inches for Bordeaux barrels, and a length of three feet four inches for packages of larger dimensions; (2) blocks of wood and wooden wedges; (3) skids of varying length, from nine to eighteen feet; (4) a hemp rope (one and two tenths inches diameter approximately) about eighty-five feet long, which is chiefly used for piling up the extreme ends of the rows. The bridges are pieces of supports, which should be as straight as possible and free from knots; after having squared the ends, those which have to rest against the barrels are slightly carved out from below so that they are less apt to slip; the other (lower) end of these blocks of wood are also shaped in a way that insures their resting firmly on the soil. These bridges are not united by crossbars; they have a length of twelve to eighteen feet. The handling of the ropes for hoist-

ing the last barrels of a row is managed in a manner best determined by some experience.

For hoisting the barrel, a supplementary workingman (the foreman who has the piling up in charge manages the crowbar) directs the ropes and helps in hoisting; he also receives the barrel when it has arrived to the top row. For taking down a barrel, ropes are equally useful, and the same precautions are needed, particularly for the fourth and fifth rows. For taking a barrel from the second and third rows, it is let down on to skids; or, after having taken away the wedges under the first barrel of the row in front of which a full barrel has been first placed, the barrels are allowed to slide down slowly and with due precaution, helping them with the crowbar and taking care to place between the supports two blocks which rest against the barrels which remain, in order to avoid all violent shocks. But this method requires great experience, to avoid accidents; and it is advisable to use it only in case when a barrel from the second row has to be taken down.

In Bordeaux the piling up of the barrels in rows is generally done by contract, undertaken by men used to this kind of work and who are organized in crews; the simple arrangements which we have just described, though incomplete, sufficiently explain how to carry on the work rapidly. But if this work would have to be done by the coopers, the great firms would have a real advantage in having more complete arrangements, such as are met with in the great warehouses of the north of France. Thus the workingmen could carry out this work with less exertion, and particularly with more security.



SKIDS, HOISTING APPARATUS, BENCHES, ETC.

26. Automatic block skids. This apparatus, constructed by the firm A. Luc, of Paris, has teeth which by an ingenious mechanism fall to the level of the skids as the barrel presses them down, rising to block it when it has passed. It is useful when there is but one man to pile up the casks.

27. Ordinary skids.

28. Inclined plane for decanting with the faucet.

In the following pages we shall undertake to describe these arrangements.

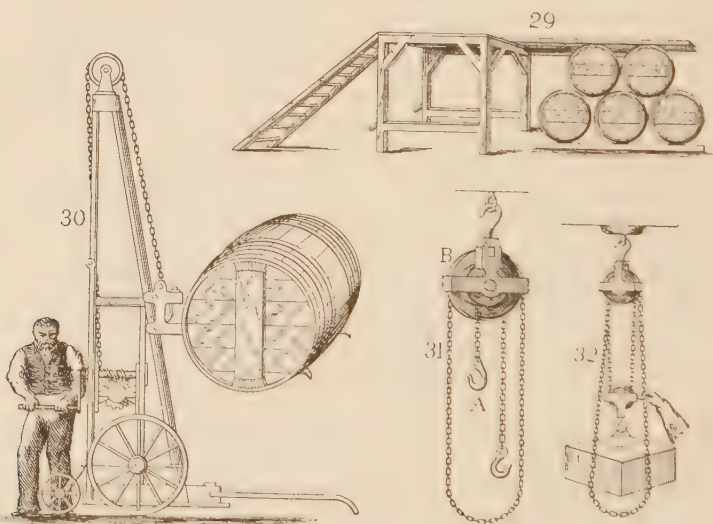
PILING UP BARRELS IN THE WAREHOUSES OF PARIS.

The utensils and apparatus which are used in Paris for piling up the barrels differ very much from those which are used at present in Bordeaux; the pine-wood bridges are replaced by skids; and, besides, a special apparatus called the tabernacle is used. The skids for piling up the casks are joists made from ash, oak, or fir; the best are those which are made of ash wood; they are from five and a half to twenty feet long and about four inches wide, from four and eight tenths to six inches high, and are bound together by flat bars, which are made from oak wood and bent inward; these bars are fitted to the joists at regular intervals of

thirteen inches. The disjoining of the ladder, which is twenty-six inches wide, is prevented by bolts which are placed under the bars at the ends and in the middle of the bar; one end of the skids is provided with double iron hooks so as to prevent it from gliding.

The tabernacle is a strong, solidly built oak table, three and two thirds feet long by two and one third wide, and reaching just to the height of the third row; its height should be regulated according to the height of the supports.

The legs of oak wood are about four inches square, and are connected four inches from the ground by crossbars of the same thickness; the upper part of the legs are connected with the table by four arms of the same thickness. The roof of the tabernacle is planked with oak boards one and a half inches thick. A strip of iron about one fourth of an inch thick, and one and a half inches wide, lines the floor of the tabernacle. This strip of iron is fixed there to receive the hooked irons of the skids (which are placed on one of the narrow sides, in order that the apparatus should have more stability). The tabernacle can be easily transported with the help of iron handles, which are imbedded into the posts.



29. Tabernacle or staging.

30. Windlass for hoisting casks. (Patented by Vernay.)

31. Differential pulley. This pulley is the one commonly employed in foundries and machine shops. One man can easily hoist up a barrel with this pulley.

32. Pulley. (Patent of the firm A. Luc, of Paris.) This pulley, as well as the one mentioned under the preceding number, is transportable and often used for hoisting freight from one story of a building to another.

It can be easily seen that with the help of the rope and of the tabernacle, it is an easy matter to pile up the barrels in all directions, and with security. In order to take down the barrels from the upper rows the same utensils are used, and a bag half filled with straw is placed beneath, in order to deaden the concussion.

MACHINE FOR PILING UP BARRELS.—We have noticed at the last industrial exhibition a machine for piling up barrels, which received the particular attention of the jury—patented machine of Louis Vernay (from Batignolles). We give the design of this machine. (Fig. 30.) It is particularly useful for piling up heavy packages in a limited space and with few workmen. It consists of a movable platform, which descends to the floor, and on which the package is placed which has to be lifted. This platform rises along an iron shaft of peculiar shape. The ascending movement is imparted by gearing, which a crank, turned by a workman, sets in motion. When the platform has reached the desired height it is made to turn on a pivot in whatever direction it is desired. By means of a special arrangement the platform can be used as a weighing machine. The machine, which is mounted on rollers, can be easily transported. Notwithstanding, however, the advantages which this machine seems to offer, it is little used, because so expensive; and further, because for the piling up of the ordinary packages in the second row, such as the Bordeaux and Macon barrels, there is required the same and even more time with the help of this machine than by the ordinary processes. This machine is particularly useful for piling up in the fourth and fifth rows. We believe it would render great services in countries where wages are high, and in warehouses where big packages have to be lifted.

Further on are represented the machines which are established on a post, or on pivots, or on rails, and which are used for hoisting weights from one story to another. Several types and models of these machines are used in cellars, such as windlasses, cranes, etc., according to the arrangements of the premises, and according to the necessity to perform the lifting vertically or on the inclined plane. (See Figs. 126 and 127.)

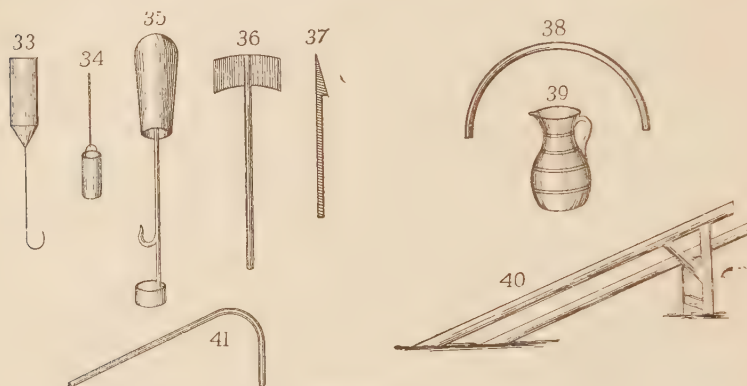
RACKING—UTILITY AND OBJECTS OF RACKING—FAVORABLE CONDITIONS OF TIME AND TEMPERATURE.

The objects of the racking are: 1. To separate the wine from the lees, which have settled on the bottom of the cask, either on standing or after the use of finings. 2. To prevent, or to stop with the help of sulphurous acid, alcoholic or acetic after-fermentations. 3. To replace in the barrels the wine which has evaporated.

The wine should never be allowed to remain long on the lees after it has become bright, either on standing or after the use of finings; because if the lees are not separated from the wine the after-fermentation, or even the simple expansion which is produced by the increase of temperature, brings these lees back in the wine, which in this case loses its brightness, and assumes sometimes a leady and turbid appearance. It has been also observed that the wine, even if it does not lose its bright condition, acquires through long contact with the deposits a disagreeable taste of lees. This sufficiently indicates the importance of racking. We have constantly observed that the wines in general, and the wines under treatment with finings in particular, which have been racked as soon as their brightness was perfect (from fifteen days to a month after treatment with finings, according to the finings which had been used, the construction of the cellar, the character of the wine, etc.), were generally brighter, had a better taste, and were less subject to "working" than the wines which had remained in contact with the finings during six

months (from one racking to the other). The wines which had not been treated with finings, which were turbid, and which had become clear on standing without the aid of artificial means, have behaved in the same way. Those which are racked as soon as they are perfectly clear are of a quality superior to those which are allowed to remain in contact with their lees from one equinox to the other.

We are going to state precisely, in speaking of the treatment of each kind of wine in particular, the reasons which necessitate racking at other than ordinary times. The chief reasons are the "working" of the wine, the expansion, the too rapid evaporation, turbidity, etc.

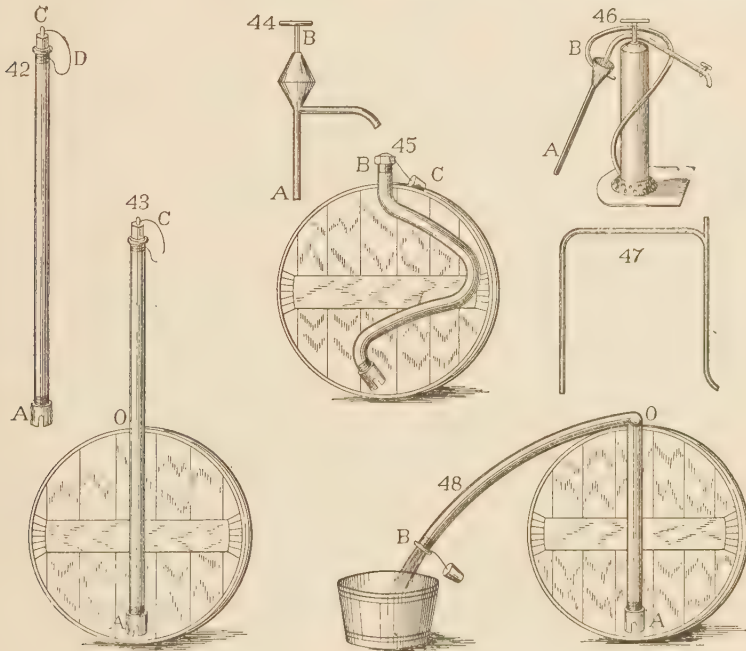


RACKING TOOLS.

- 33. Sulphur-burner or ordinary wickholder.
- 34. Cup for collecting the drops of fused sulphur.
- 35. Improved sulphur-burner.
- 36. Tilt-hammer or bung-starter.
- 37. Iron instrument used to assist in bung lifting.
- 38. Copper tube. This is a siphon, or cast tube of semi-oval form, with an inner diameter of 1 to 1.2 inches.
- 39. Can measure, of a pattern employed in Bordeaux.
- 40. Horse for the purpose of decanting.
- 41. Half siphon (of Sourbé).

The remarks which follow apply only to wines the vinification of which has succeeded well, which are bright, which do not "work," and which are stored in perfectly close cellars; in this case, the young wines are racked four times during their first year; the first racking is done as soon as the wine becomes transparent, and before the after-fermentation is formed; and if it is not immediately filled up the wine undergoes a change; the second racking is effected in March, before the vines form new shoots, during the spring equinox; the third, during the blossoming of the vine in June; and lastly, the fourth, during the autumnal equinox in September. The old wines should be racked twice a year, in the spring and autumnal equinoxes. But we repeat it here, even if the wine has been racked at the ordinary periods, this should not be considered sufficient, if it has undergone changes or a new fermentation. It is also very important to ascertain if the barrels are full; this is very easily done when the barrels are placed with the bung-hole upwards; but if they are placed with the bung-hole sidewise, it happens often that owing to several reasons, the chief of which are leaks and a too frequent taking out of samples, a considerable empty space is formed.

To perform the ullage, a gimlet hole is bored in the bottom of the barrel near the bulge, and a small Z-shaped funnel introduced; another hole is pierced through the bulge and the wine poured into the funnel until it flows out of the upper gimlet hole; then these holes are closed, and the stopcock and funnel removed. This operation should be repeated every time when samples have been taken out of the barrel, and in cellars in which the loss by evaporation is considerable in the intervals between the rackings. It is preferable to rack in dry weather, when the wind blows from the north or from the east, and when the moon is decreasing, rather than in rainy weather with south or west winds and when the moon is increasing. For it should be known that



PUMPS AND SIPHONS.

42. Siphon made from india-rubber. This siphon contains a metallic spiral, which keeps it hollow while bent; the lower part, *a*, is provided with an indented tube, in order to facilitate the introduction of the liquid; a second metallic tube, *b*, is fastened to the other end of the india-rubber hose. This tube can be closed by an india-rubber stopper, *c*, which is tied to the hose by the string, *d*. The inner diameter of the siphon is about 0.8 inches. In order to use it, it is introduced open in the full barrel (compare Fig. 45); it bends in *cc* and *c'c'* and fills; the india-rubber stopper is now introduced, and then the hose is lifted vertically, as shown in Fig. 43. By bending it appears in the manner shown in Fig. 48; a vessel is placed under the stopper, which is now taken out; the liquid runs out without the necessity of the tube, as in the case of ordinary siphons.

43. Compare description in 42.

44. Hand pump. The lower rod *a* of this pump has a length corresponding to the depth of the casks with which it has to be used; it is also possible to connect it by means of an india-rubber tube with a movable rod, which can be made longer or shorter, according to necessity. This pump is particularly useful when the liquid has to be drawn from a partly filled cask.

45. Compare description in 42.

46. Planchon pump. This is a compressed air pump described in the text. The rod *a* is introduced into the barrel; *b* fits the bung-hole.

47. Siphon of trapeze-form, with tube for carrying a candle.

48. Compare description in 42.

hot and moist winds impart to the liquids an expanding movement, which is apt to disturb the lees. Cold and dry winds exercise, on the contrary, a certain contracting influence by lowering the temperature. The phases of the moon seem to have, also, an influence on the expansion.

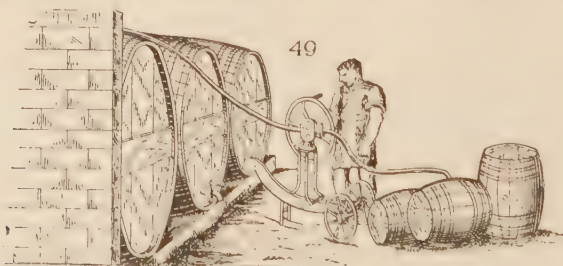
The racking and the pumping over of the wine should be performed sheltered from the direct contact with the air; care should also be taken to burn a piece of sulphur wick in the empty barrels which are intended to contain the liquid, in order to neutralize the oxygen of the air which they contain by means of the sulphurous acid. If the racking is done, the air being allowed to have free access, and without burning sulphur, not only a portion of the bouquet and of the alcohol are liable to evaporate, but also the danger is present that the wine may ferment anew.

HOW TO DO THE RACKING—METHOD USED IN BORDEAUX.—According to this method the wine in the barrels of the lowest and second rows is racked so that the immediate contact with the air is avoided; the wine which is contained in the barrels of the third, fourth, and fifth rows is exposed to the air only for a moment on entering the funnel. However, it is sometimes possible to avoid this contact by making the tubes dip into the funnel.

The utensils necessary for racking, whose description and pictures we have given, are the small adz, a fine smooth glass, a bung-starter and bung-screw, two or three brass stopcocks with straight socket, a wooden basin, two heart-shaped buckets, called bassiets, a specially constructed bellows, air force pump, two wooden funnels and a can, wooden tubs of various shapes and dimensions; one for the barrels of the first row, one for those of the second row, and one for the third, fourth, and fifth rows. The remaining tools are shown in the illustrations.

When the passages are very narrow the racking is done without the empty barrels being placed in the passages, for which a hose or long tube is necessary.

In order to rack the barrels of the first row, if they are placed with the bungholes upwards, the cock is placed as follows: After having wound a strip of linen round the stopcock, a hole is bored with the



49. Rotary pump specially designed for filling and emptying large casks.

auger, or, if a hole has been made already, before the plug is removed, and the stopcock inserted with some slight knocks of the mallet; then connect with the empty barrel which is destined to hold the wine. Around the ends of the wooden tube are wound strips of linen; one end is then inserted in the nozzle of the stopcock, and the other in the hose con-

necting with the empty barrel, which is placed in equilibrium by wooden blocks.

If the bung is removed it should be taken out with the help of the chisel or bung-screw. In no case should the tilt-hammer be used before racking, neither should the staves be cut or hammered, for that might cause the lees to rise in the wine. For the same reason we should avoid imparting any shocks to the rows of barrels.

The stopcock once open, the wine runs without coming in contact with the external air from one barrel into the other until the liquid has reached the same level in both. Now the bellows are placed on the barrel which is to be emptied and fastened to it by means of a hook. By blowing into the first barrel the air is compressed, and the wine forced to pass into the empty barrel.

When it has reached the level of the stopcock, a certain noise, a *glow-glow*, which is produced by the air which enters between the stopcock and the wooden tube, can be heard. Then the stopcock is closed, the bellows taken down, and the full barrel is bunged. Then the end of the tube which is in the stopcock is taken out, a little wine runs in the basin, and as soon as the air begins to enter the tube the other end is taken out, and the plug replaced; the tube drains into the bucket. After that the bung is taken out, and a funnel is placed on the barrel, which is not yet entirely filled. The stopcock is opened now, and the barrel which has been racked is lifted in order to get out of it all the clear wine which is collected in the basin. The lifting is done by a second workingman with the hands, or, still better, with the help of a crowbar, or of a jackscrew, but always without concussions or rapid movements. As soon as the wine begins to be turbid, which can be ascertained with the help of a candle, or of a tumbler, which is made of fine glass, the stopcock is closed, and the wine which is in the basin poured into the barrel. Instead of a fine glass, a silver cup may be used, but the condition of the wine is not so well recognized in it.

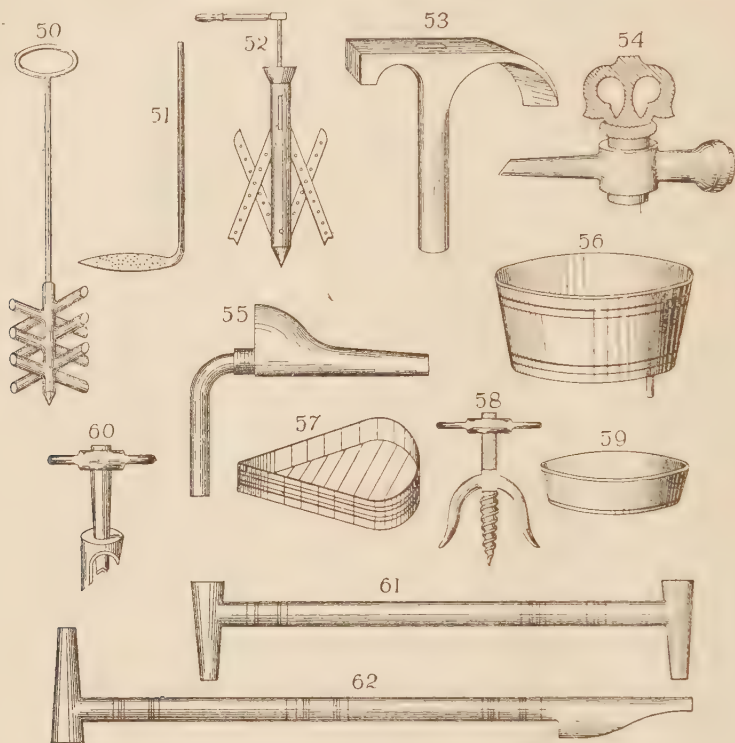
Lastly, the stopcock is taken out, and a plug inserted into the racked barrel, from which the lees are to be immediately removed.

The plugs are covered with cloth in order to close exactly any unevennesses made by the removal of the same, and to render them easily taken out at the following rackings.

The racking of the barrels in the second, third, fourth, and fifth rows is much simpler. For the second row, after having made a hole in the barrel and introduced the stopcock (always with the bucket below, and with the same precautions as for the barrels of the first row), the empty barrel is placed below. One of the ends of the wooden tube, which is called *dogshead* (see Fig. 55), is introduced in the bung-hole of the empty barrel, and the other end, around which a strip of linen is wound, enters the stopcock hole of the barrel to be decanted. When the liquid has run out the tube is taken out and the barrel which has been racked is moved aside. Then a bucket with a funnel is placed under the stopcock to receive the residue of the wine in the barrel. For the barrels of the third, fourth, and fifth rows the tubes enter directly the funnels which are placed on the empty barrels, and the lifting of the barrels for emptying the residue of the liquid is done without moving them.

CLEANLINESS.—The empty barrels which are destined to be filled should be rinsed until the wash-water has no more color; if the lees are greasy

the barrels are rinsed several times with a good quantity of water. They should not be sulphured until the wash-water has been well drained off



UTENSILS USED IN WORKING (*foulage*) AND RACKING WINES.

50. Stirrer (Bordelaise).

51. *Dodine*. This instrument, as well as that which is described under the following number, is used most frequently for working and mixing the finings in large casks, barrels, and tanks.

52. Stirrer (Barignan). This apparatus is introduced (being closed) through the bung-hole. Its arms are afterwards opened by simple pressure; the stirring is produced by simple rotary movement; it then closes like an umbrella.

53. *Adz*. This is one of the most useful of cellar instruments.

54. Racking stopcock (Bordeaux style), with straight socket.

55. Dogshead (compare *racking* as practiced in Bordeaux, and described above).

56. Racking funnel. Several kinds are used with simple outlet and with automatic arrangements which stop the outflow as soon as the barrel is full. Their use is not a very common one, because the mechanism is liable to get out of order or the large dimensions of their sockets make their handling inconvenient. However, if the racking and filling up has to be done by poorly skilled workmen, this kind of funnel renders great service.

57. Heart-shaped filling tub.

58. Plug drawer or bung-screw.

59. Wooden basin used in racking.

60. Auger (wimble). Several patterns are met with in the trade; thus, this one is used simply to round out the bungholes, which have already been made, and to remove the unevenness. Then there are the ancient augers with conical blade. The modern augers have a kind of English screw, which pierce a cylindrical hole of smaller diameter than that of the bunghole or gimlet hole; above this screw is a conical socket with blades to take out the unevennesses and enlarge the aperture made by the gimlet end.

61. Is a wooden tube, and composed of three parts. These three parts are united or held together with leather strips indicated on the drawing.

62. Same as the above. Its construction differs from that of the foregoing only in this respect, that one of its ends is straight.

and just before filling, otherwise the water which is adhering to the staves would become impregnated with sulphurous acid and would communicate to the wine a disagreeable taste of sulphur, which would not disappear for many days. The tools and utensils used for racking should be cleaned and rinsed with plenty of water every day, and when not in use they should be always placed so as to dry, otherwise the adhering wine would soon become acid, and thereby injure the wine with which these instruments are brought in contact. The tubes should be taken to pieces and the lees which stick to their inner walls should be scraped off with bottle brushes which are fastened to long iron rods. This cleaning should be done every week in a well kept cellar. The wine which drops from the leaks and which falls in the bucket should be poured on the lees and not in the wine which has been racked. The basin should not commonly be placed on the dirty floor of the cellar; it should be put on blocks of wood, in order to prevent contamination with earth and dust.

MACON METHOD OF RACKING (used in the warehouses of Paris).—Necessary utensils: An *ascette* or small adz, centerbit wimble, which is provided with a screw of the diameter of the spigot-holes, two or three copper faucets bent round of a shape which is called *Maconnaise* (Fig. 64), two heart-shaped buckets, one basin, two wooden funnels, a wooden hammer, two wooden jugs of a capacity from three to three and a half gallons, two tin tubes which can be joined with the faucets and which can be lengthened or shortened, according to necessity, their ends fitting in each other, a small jackscrew, a silver cup, a gimlet, and spigots.

In order to rack barrels of the first row a heart-shaped bucket is placed under the barrel, in which a hole is made with the centerbit wimble; if there has already been a hole made, the plug is removed. If the barrel is placed with the bung-hole sidewise, several gimlet holes are also made in the upper stave in order to let in air, and with the help of the wooden hammer the faucet is driven in. Below the faucet one of the jugs is placed. The empty barrel is now brought in the proper distance, made firm with the help of wooden blocks, and a funnel placed in it. Now the faucet is opened, and, changing the jugs quickly, we avoid closing it every time, which is apt to disturb the lees; the jugs are emptied in the funnel, and when the barrel has to be lifted the remainder is emptied either into the heart-shaped bucket or into a basin. The clear condition of the wine can be ascertained with the help of an embossed silver cup, but a wine which appears transparent in the cup may be found to be turbid if looked at by candle light in a fine and smooth glass. After racking the faucet is taken out and a spigot is inserted.

The barrels of the second row are racked by connecting the end of the tube with the *Maconnaise* faucet. The third, fourth, and fifth rows run out directly through the tube, which is lengthened according to necessity in the funnel, then, as in the Bordeaux method, there is no necessity of moving the barrels from their place. This system of racking has the objection of making the wine in the barrels of the first row flat, by being racked off jug after jug. The same inconvenience occurs, though in a less degree, for the upper rows. The tubes do not join the faucets tightly, and can only be placed vertically, while the wooden tubes of the Bordeaux pattern can be placed in inclined positions, which allow us, if



TOOLS FOR RACKING AND BLENDING.

63. Racking bellows (Bordeaux fashion). The liquid in the two barrels being on the same level, the socket of the bellows is introduced through the bung-hole *a*; by blowing a pressure is exercised on the wine to be racked, causing it to pass from the barrel *a* into the other barrel.

64. Stopcock for racking (pattern used in Macon).

65. Stopecock funnel (Macon method). Arranged such that it can be hung to the projecting flange of the bent stopcock of the preceding number.

66. Chisel for taking out the spigots (Maconnaise method). Instead of using a plug screw to bore out the spigot, a part is taken out with the help of this chisel, and what remains of it is driven back with the end of the stopcock, which is forced in later with the help of the mallet, No. 68.

67. Piece of pipe, made to fit and extend the tube described in No. 65.

68. Maconnaise mallet.

69. Ordinary centerbit wimble. It is fitted with an English bit of adjustable diameter.

70. Screwjack for the purposes of racking, system Viver.

71. Flexible tube (patent Kehrig). This is an india-rubber tube, with metallic spiral in the interior, which keeps it open at various angles.

72. Maconnaise jug. Capacity, half a gallon to four gallons.

73. Automatic siphon. This is an india-rubber tube, which contains, like the tube, No. 71, and the siphon, No. 42, a metallic spiral, which prevents its closing when it is bent. It is provided with a straight and very short stopcock; it is filled by introducing the open end through the bung of the barrel; then the stopcock is turned, and the tube whose end is kept below the level of the liquid is bent; it is sufficient to open the stopcock to start the outflow.

necessary, to rack from the end of the rows without placing the barrels in the passages.

As far as the rapidity of the work is concerned, workingmen who are familiar with either of these methods will be able to do approximately the same amount of work in the same time.

PUMPING THE WINE FROM ONE BARREL INTO THE OTHER—VARIOUS SYSTEMS OF PUMPS, OF SIPHONS, ETC., FOR RACKING.—There are several kinds of pumps and siphons which are specially designed for use in the wine cellar, but none of them fulfills the desired aim, viz.: to extract the whole liquid portion without producing a turbidity through the rising of the lees (avoiding at the same time the contact with the air), and without imparting concussions to the full barrels; and without leaving in them too much of the lees, whether they be in the first or in the upper rows.

FAUCET.—in order to transfer the liquid from one barrel to the other by means of the faucet (or racking stopcock), it is necessary to pile them up, to draw them up an inclined plane, or to place them on supports such that we may be able to place below, either empty barrels or vessels, jugs, basins, etc.

SUCTION PUMP.—The ordinary tin or copper pumps cannot be used for racking, for they would make the lees rise, unless a valve is adapted to the lower end, which would regulate the inflow of the liquid and would leave the lees during the suction far below its level; but they can be very useful for emptying barrels with the bungholes upwards in narrow passages where siphons cannot be used. These pumps can also be used with viscous or disagreeably smelling liquids, such as oils, vinegar, alcohol, etc.

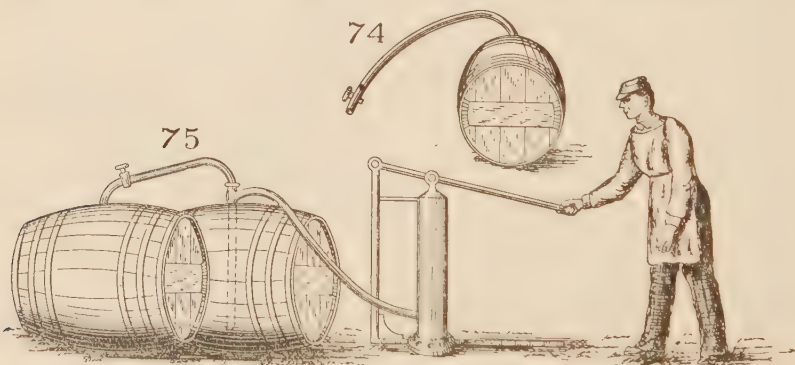
SUCTION AND FORCE PUMP.—This pump, which is constructed after the principles of the fire engine or spray pump, cannot be used for racking unless a special appliance is attached to them with a plunge tube. Already for several years rotary and centrifugal pumps have been used provided with faucet tubes and accessories, which make it possible to use them in the wine cellar. They are used particularly in the south of France. We shall have an opportunity to examine them in describing the new utensils.

COMPRESSED AIR PUMP.—This pump, which the inventor calls wrongly "*pneumatic apparatus*," is used profitably when liquids have to be transferred and the contact with the air has to be avoided. With a slight modification, which consists of replacing the inner tube by a simple cork, this pump is suited to replace the racking bellows. Its construction is founded on the fact that the air compressed in a closed vessel can drive out by the pressure the liquid which is in this vessel if a tube communicates from this liquid with the surrounding air or other open package.

The action of the pump is analogous to that of the bellows used for racking the barrels in the lowest row. This kind of pump can be profitably used for pumping wines, and particularly alcohol, vinegar, etc., in casks. The full casks should be in good condition; should they have leaks the compressed air would either increase the leakage or entirely

whistle out. To use this pump, the needle which is at the end of the tube is so gauged as to leave a couple of gallons of liquid in the barrel. The movement of the piston should be stopped as soon as the air begins to enter the tube; without this precaution the lees would be stirred up. If it should be necessary to obtain a perfectly clear liquid, much wine would have to be left in the barrels. As we have already said, this pump has a movable tube provided at its end with a needle, which is equally movable. This tube is placed in the interior of the cask, whose bung-hole is hermetically closed by a kind of casing containing two holes; one of these holes is used as a conduit for the wine with the help of a copper tube which tightly joins the movable tube, and whose end is provided with a stopcock. The second opening has no inner tube, but connects with the bellows or pump by means of a flexible tube and introduces the compressed air into the barrel.

The length of the needle which is adjusted to the inner tube, is regulated according to the quantity of the lees which are presumed to be in the barrel, after which the pump will not work lower than the desired level; it follows that all the barrels are racked to the same level, whatever may be the quantity of lees which they contain; by this means we may either leave too much or carry off a portion of the wine, and the racking is done somewhat blindly. Then, besides that drawback, the lees may be stirred up and mixed with the wine through the introduction of the tube. One is not sure, therefore, of racking off a clear liquid unless much more lees are left in the cask than may be necessary.



74. Automatic siphon, ready for working.

75. Laburthe pump. This pump works on the same principle as the air force pump shown in Fig. 63.

There exists another system of pneumatic pumps, which, by producing a vacuum in the barrel to be filled, suck in the liquid from the full barrel. The liquid in the latter is driven out by atmospheric pressure. This system does not offer the advantages of the force pump or of the bellows.

SIPHONS.—Several kinds of siphons, made from tin, glass, and copper, are manufactured. The simplest and that most commonly used in the trade are semi-oval or trapeze-shaped tubes. Some are made with a double tube. (Fig. 47.) In order to use them the end is closed, and the liquid sucked slowly up till it fills the tube which is parallel to the great bend. This is a convenient instrument in the hands of people

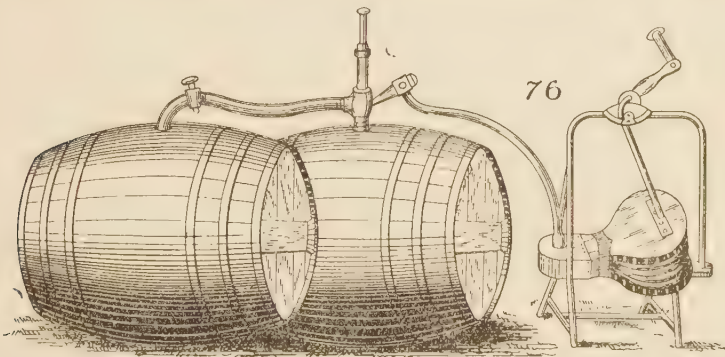
who are not accustomed to the handling of a siphon, and who do not care to suck the end of the siphon direct.

Certain siphons are provided at the end of their great bend with a small stopcock, after the manner of a damper used in stove-pipes. With this kind of siphon it is possible to avoid repeated sucking. There are also made half siphons with short bends. They come very handy sometimes, for instance in testing wines, etc.

The kind of siphon which accelerates in the most effective manner the work, is the copper tube simply bent to a half circle. These tubes are made of various calibers, according to the diameter of the bungholes. A certain experience is necessary in the use of these tubes, but if one knows how to handle them they offer, like the half siphons, great advantages compared with all the above mentioned instruments.

Neither the siphons nor the tubes which we have just mentioned can be used for the racking of wines, because they are apt to carry with the wine some small particles of the lees if they are sunk too deep in the casks. If, on the contrary, they are not sunk in sufficiently deep, there remains too much with the lees in the cask. But they are a great help in the simple transferring of wine from one barrel to another.

The transferring of wine from one barrel to another by means of a semi-circular tube may be done rapidly without exposing the wine to the contact of the air. This is done by lifting the full barrel onto a wooden horse (Fig. 40), consisting of an inclined plane ten feet long, two and



76. Racking pump (Viver system). This apparatus is used for racking and decanting wines, and is like the compressed air pumps (Planchon and Laburthe) which have been already described. Besides this, it is used to measure automatically; that is to control the quantity of liquid to be taken out of the barrels, either for equalizing the contents or for blending. A movable vertical tube, which is graduated, reaches into the barrel; the numbers which are marked on the tube correspond to the quantity of liquor which has to be taken out; when this level is reached the introduction of air stops the outflow. This apparatus is fitted with a newly patented rotary blower.

one half feet high, and two and one quarter feet wide. It is framed from pine wood, two 3x5 joists, which are bound together by two cross-pieces. The supports are placed one foot from the end, in order to facilitate the rolling forward of the packages for draining them. These supports have two cross-pieces and two braces well mortised into the uprights, which with the cross-pieces bind the joist with the support which is nearest. The dimensions which we have given are those of a barrel-horse. The horse which is used for larger packages is eleven and

two thirds feet long, and two and two thirds feet high; the joists are four inches wide and five inches high.

The full barrel when once lifted is kept in its place by a triangular cross-piece, and the empty barrel is rolled in front of the horse, blocked securely, and the bung taken out. The bung is now taken out of the full barrel, and one of the ends of the semi-circular tube introduced into the bunghole; the other end is sucked and quickly put in through the bunghole of the empty barrel. The wine will rapidly run from one barrel into the other, and its outflow may be facilitated by lifting gradually the full barrel towards the empty barrel until the whole contents of one have run out into the other; the residue of the liquid is emptied with the help of a can and funnel.

Sometimes the contents of a full barrel, particularly if it is a large one, are transferred without the barrel being lifted onto the horse, but always with the help of the semi-circular tube. For this purpose an empty and a full barrel are placed side by side; after having taken the bungs out, the tube is introduced into the full barrel, then filled by suction, and quickly brought into the bunghole of the empty barrel. The wine now flows from one barrel into the other until it has reached the same level in both; the emptying of the barrel is then completed by lifting the partly filled barrel onto the horse. This method can be used advantageously in the "half-and-half" blending operations.

With siphons it is also possible to transfer the wine by the aid of cans and jugs, from which the wine is poured into the empty barrels; but this method is less rapid and has the objection of making the wines flat—particularly the fine wines.

To sum up what we have said, the best methods for racking are those which preserve the wine in the most effective way from contact with the air. Such is the Bordeaux method, which is used in some parts of Burgundy as well as in Bordeaux.

The same remarks can be applied to the process of simply transferring wine from one barrel to another, and for the same reasons the transfers by means of the pump, or the half siphon, or the compressed air pump, or the rotary pump, for casks of great dimensions and perhaps in poor condition, are preferable.

SULPHUROUS ACID GAS; ITS NATURE; PROPERTIES; USE IN THE TREATMENT OF WINES—SULPHUR WICKS; THEIR MANUFACTURE, ETC.—Sulphurous acid gas is the product of the combustion of sulphur; it is nothing but the smoke of this combustion; composed of one part of sulphur and two parts of oxygen. The specific gravity of this gas is greater than that of the air. In the gaseous state, sulphurous acid gas is miscible with water. The latter can absorb several times its own volume of the gas. It neutralizes the oxygen of the air and possesses also the property of changing or destroying a great number of organic colors.

This acid can also be used for the conservation of food, be it vegetables or meats, by keeping these substances in hermetically sealed vessels, in which sulphur has been previously burned. The quantity of sulphur used should be proportional to the dimensions of the vessel; the combustion stops on its own account as soon as all of the oxygen is used up.

These properties of sulphurous acid have been utilized since time immemorial for the purposes of vinification and that of conserving barrels and casks. For the different uses to which it is applied, the

sulphur should be free from all admixtures. It is used for the following purposes:

(1) To prevent the must from fermenting, by which means are made what are called unfermented wines.

(2) To stop the first violent fermentation, when it has already begun, or to prevent and stop the alcoholic after-fermentation.

(3) To prevent the wines from becoming acid, moldy, or flattish, through contact with air, when the barrels are not quite full.

(4) To preserve in a good state the empty barrels, and to prevent the moldiness and acidity which are liable to develop in the interior of the casks.

(5) Lastly, to redden and make more flexible the wicker which is used for the hoops.

In the various operations which we are going to describe, wicks impregnated with sulphur are used. These wicks are strips of linen which have been dipped several times into molten sulphur, according to the thickness which it is intended to give to the coating. It is advisable to use wicks rather with a thick coating of sulphur than with a thin one, particularly for the purpose of treating wines, because the combustion and carbonization of too much linen may communicate a disagreeable taste.

If the wine maker resides far from the great manufacturing centers, he may easily manufacture the sulphur wicks; the operation is very simple: In a suitable dish the sulphur is fused on a slow fire, and strips of thin linen 12 inches long by 0.8 to 1.2 inches wide are steeped repeatedly in the melted mass, until a coating of sufficient thickness is obtained.

Nowadays flower of sulphur (purified sublimed sulphur) is to be found at all the druggists of wine-growing countries. By the use of this kind of sulphur better wicks will be obtained than those which are made with impure crystals. In order that the wicks may be of a fine yellow color, the sulphur should be fused on a very moderate fire and the temperature raised gradually. It fuses at 228 degrees Fahrenheit. For this operation a large and flat stewpan is more convenient than a deep vessel. A partition perforated with holes or open at the bottom is soldered in the middle of the pan, thus forming two compartments. The flower of sulphur is placed in one of them, and the fused sulphur runs into the other. As soon as the sulphur is fused, the strips of linen are soaked in it, and turned from one side to the other by holding them at one end with pinchers. The wick is now allowed to drain for a few minutes by holding it vertically above the pan, and then it is placed horizontally on a large board near the stove. The wicks cool off very suddenly, and thus the board is covered with them. Afterwards the first wick is taken and soaked again in the sulphur, and so on, until a layer of sulphur of the desired thickness is obtained.

In order that these wicks should burn easily in the barrels, they are suspended by an instrument which consists of a wire whose one end is bent to the shape of a hook, and whose other end is fitted into a cylindro-conical wooden handle which closes the bung-hole hermetically. (Figs. 33-4-5.)

Practical Method of Stopping the Fermentation of the Must.—This operation is most frequently performed with the musts from white grapes a short time after they have been pressed. The grapes are gathered with

care, stemmed, and crushed in the ordinary way. Then the must is separated from the bulk of the lees. This is done by pouring the must from the press into a vat or pipe. The must becomes clear on standing, but it is important to draw it off before the fermentation begins. The starting of the latter is indicated by numerous bubbles of carbonic acid which rise to the surface. It is necessary to wait eight or twelve hours to obtain a clear must. Sometimes even the must has to be watched during the night if it is considered important that it should be clear; for as soon as the fermentation starts the must becomes turbid.

Unfermented wines, or preserved musts, are used to communicate sweetness to the new wines which show a deficiency in this respect; for making concentrated must, if it is not possible to carry out the concentration on the spot; or for the preparation of certain sweet wines. To make unfermented wine in the right way, the must should be previously freed from the fragments of skins, of the seeds, etc., which it contains. For this purpose a peculiar wicker basket, with very small meshes, is placed below the opening of the press, and thus a part of the impurities remains in the basket. The same end is attained by using an ordinary basket, whose bottom and walls are covered with several layers of inter-twisted straw. The casks which are destined to hold unfermented wines are previously rinsed with boiling water, then with cold water, and carefully drained.

The fermentation of the must can be prevented in two ways. The following is one of them: In an empty barrel two squares of sulphur wick, more or less, according to the thickness of the layer of sulphur, are burned, but always enough to use up all the oxygen present. Then the must is rapidly filled into the barrel, so as to make it half full; the barrel is now bunged as firmly as possible, and rolled and moved in all directions, to allow the sulphurous acid gas to become well absorbed by the must. This must is then transferred (protecting it all the time from contact with the air) into another barrel, which has been sulphured in the same manner, and which is bunged, rolled, and moved in its turn just as was the first one. During this time sulphur is burned again in the first barrel, which has been emptied and the must transferred back to it again; the barrel is again moved about and rolled, and its contents transferred into another sulphured barrel, which is bunged and treated in the same manner as the other barrels. This must has been therefore treated four times with sulphurous acid gas. The barrel is now completely filled with other must, which has been treated in the same manner, and solidly bunged.

In performing these operations, contact with the air should be avoided as much as possible.

Another method of preventing the fermentation of the must is given in the following: A square of sulphur wick, representing about one and a half ounces of sulphur, is burned in an empty barrel; then five gallons of must are poured into the barrel, which is hermetically bunged and rolled; after some time the bunghole is opened, and an attempt is made to burn a second wick, but if the oxygen of the air has been used up by the combustion of the first wick, it is necessary to renew the air in the barrel, which may be done with the help of a pair of ordinary kitchen bellows. When the second wick is burned, five more gallons of must are added, the barrel bunged, and again rolled and shaken. This same operation is repeated until only five gallons more of must are required

to fill the barrel. These last five gallons are treated separately with sulphurous acid in another barrel, and then poured into the cask to fill it completely; after that the barrel is definitely bunged.

Classification of the Preserved Musts—How to Treat Them.—They should be filled into strong barrels, which are solidly hooped with iron and firmly bunged. The barrels should always be placed with the bunghole upward, and in air-tight cellars whose temperature is constant. They should be kept well filled by making up the loss from evaporation every five days with preserved must; these musts should be also frequently racked, in order to free them from sediments and from the ferments which they contain. In racking, avoid contact with the air as much as possible, and use barrels which have been thoroughly sulphured. A complete clearing is obtained by introducing in the must before treatment with sulphurous acid about three quarters of an ounce of tannin per barrel (alcoholic tannin solution is mostly used), and by pouring into the barrel, before filling completely, a cold solution of two tablets of gelatine in one pint of water. The treatment with sulphurous acid partly discolors the musts. To prevent the fermentation of the must, some chemists have proposed to use, instead of sulphurous acid gas, sulphite of lime, sulphuric acid, carbonate of iron, evaporation in vacuum pans, etc.; but these different processes are generally more expensive than the use of sulphur, or possess the objection of imparting a foreign taste to the musts. Up to the present there has not been found an easy and economical method for the above, the use of which does not impart a foreign taste to the wines, and which could profitably replace sulphurous acid gas. Here I must remark that musts can be also preserved, without fermentation, by fortifying them to an alcoholic strength of 15 per cent of alcohol.

Method of Stopping the First Violent Fermentation.—To stop the violent fermentation of white wines, they should be racked and poured into barrels which are more or less sulphured, according to the degree of violence which the fermentation has reached. As far as the red wines are concerned, great cautiousness should be exercised in using sulphur, if it is either desired to prevent the after-fermentation or the access of the air during racking, for the sulphurous acid precipitates a part of the coloring matter, particularly in the case of ordinary wines which are low in alcohol and tannin. Only when the fermentation is very violent is it advisable to thoroughly sulphur the empty barrels destined to hold them; under ordinary circumstances, it is sufficient to burn a small quantity of sulphur, particularly when the wine is in its first year; a still smaller quantity will answer when it is in its second year.

Partly Filled Barrels.—In order to prevent the wine from becoming sour and moldy when the barrels are only partly filled, it is sufficient to burn a piece of sulphur wick in the barrel and to bung hermetically. This operation is repeated every time the bung is taken out, and at least every fortnight, if the barrel has to remain bunged for a long time. It is advisable to avoid as much as possible leaving the barrels partly filled, because in the end the sulphurous acid communicates to the wines a disagreeable taste, which disappears only after a long time. It is possible to sulphur a partly filled barrel without taking out the bung. For this purpose it is sufficient to bore a gimlet hole in the upper part of the bottom, and to hold at this opening a sulphur wick every time

when the wine is drawn off by the stopcock. The air, in rushing in through the gimlet hole, draws in the sulphur vapor; afterwards a plug is introduced in the gimlet hole.

Keeping the Empty Barrels.—In order to preserve the empty barrels in good condition, it is necessary to rinse them with plenty of water when they are dirty, and to burn some sulphur in them, and let them drain for some hours; they should be, also, solidly hooped and bunged. By burning in the barrel (after a first treatment with sulphurous acid and a complete draining) three squares of sulphurous wick, and by bunging hermetically afterwards, moldiness, acidity, etc., are avoided. It is possible to burn the sulphur without using a hook, simply by cutting the sulphur wick into long strips and removing the sulphur from one of the ends, by which it is suspended from the bung-hole by bunging the barrel after having lighted the other end.

Making the Wicker Flexible.—To redden the wicker and to make it flexible, it is sufficient, after having moistened and drained it, to expose it to the sulphur vapors in a barrel whose bottom has been taken out, and which is covered carefully in order that the vapors should not escape.

CHAPTER II.

CLARIFYING WINES.

Preliminary remarks. Various finings; their application. Finings which exercise a mechanical action; filtration. Alkaline finings. Albuminous finings; fresh white of egg. Albuminous substances which are not entirely coagulated; fresh or dried blood. Gelatinous substances; gelatin. Various other substances which are used for purposes of fining. Decoction of animal sinews. Recapitulation; the best finings.

Preliminary Remarks.—Wines become turbid and lose their brightness owing to several causes, chief of which are: 1. The after-fermentation or the “working,” which impairs the brightness of the wine by keeping in suspension the insoluble matters which, on settling, gradually form the lees. This latter is composed of different salts, ferments, mucilaginous substances, and of the insoluble coloring matter. 2. The expansion which is produced by the rising of temperature. 3. The motion which the wine undergoes during transportation. 4. The blending together of several wines, which renders insoluble and precipitates a part of the coloring matter, and often produces salts equally insoluble. 5. The deficiency in vegetable albumen and tannin, which should be present in order that the matters which become insoluble should be precipitated with the lees.

The fining of wines can be performed in various manners, either by allowing Nature to do the work, or, artificially, by the different methods of fining, the details of which are given below.

The wine becomes clear simply on standing and on being racked from time to time, if the grapes from which it was made were ripe, if the vinification was effected under favorable conditions, if the young wine was carefully treated after the first rackings, and last, not least, if the cellar in which it was stored answered its purpose. Under such conditions, perfectly bright wines can ordinarily be obtained without the help of artificial means.

Before discussing the different methods of fining, we will say that, though it is very important to fine turbid wines on account of the coloring matter, the ferments and the salts which they keep in suspension and which impart to them a common taste and make them liable to undergo an after-fermentation, it is also desirable to avoid the too often use of artificial methods of fining. For by these operations not only the insoluble matters which are in suspension are precipitated, but also the different preserving elements of the wine, which otherwise would not become insoluble, excepting after a very long time. These latter substances are tannin, the various mucilaginous substances, and the pectine, which impart to the wine the mellow and fruity taste and the oily consistency. The repeated treatments with finings affect these qualities and destroy them in the end; they make the wine dry, and thus remove that which imparts, particularly to the first-class wines, their principal value. To prove this assertion we can state that we have always noticed that well made and properly treated wines which cleared perfectly after standing some time—judicious racking only having been applied, but no artificial fining—are superior in every respect to those which have repeatedly undergone an artificial treatment; they possess also more fruity taste, are more oily, and show more color.

It is, therefore, not advisable to apply finings, particularly in the case of first-class wines, excepting when a perfectly bright condition cannot be obtained by natural means. It is never advisable to apply artificial means, unless it is absolutely necessary; and it is important to find among them substances which are able to clear the wine perfectly without altering the color and the taste; these substances should likewise possess the property of not leaving in the liquid any soluble residue, and they should exercise their action by rendering insoluble as little matter as possible.

The substances commonly used in fining wines can be divided into six classes, according to the difference in their action; this action can be purely mechanical, or may give rise to some chemical reaction; it may be the coagulation by alcohol or tannin, or the neutralization of the tartaric and acetic acids, etc.; it may also consist in a partial solution of certain substances in the wine.

1. Substances which exercise but a simple mechanical action without leaving in the wine a soluble residue: unsized gray paper, reduced to a pulp, fine and siliceous sand, filtration through a strainer, etc.

2. Alkaline substances which exercise a mechanical and chemical action by neutralizing a part of the acids contained in the wine, and by forming with them soluble salts, calcined and pulverized pebbles, calcined oyster shells, pulverized marble, pulverized chalk, calcined magnesia, etc.

3. Albuminous substances which exercise a chemical and a mechanical action, and which are mainly coagulated by alcohol and in a less degree by tannin, without leaving in the wine a soluble residue: pure albumen (fresh white of eggs).

4. Gelatinous substances which exercise a chemical and a mechanical action; they are precipitated chiefly by the tannin which is contained in the wine, and do not leave soluble residues, as gelatine, isinglass.

5. Albuminous substances which are not entirely coagulated by alcohol, and a part of which remains dissolved in the wine: fresh or dried blood, milk.

6. Various gelatinous, viscid, or gummy substances, which are not entirely coagulated and precipitated by tannin and alcohol, and a portion of which remain dissolved in the wine: a decoction of animal sinews, gum arabic, starch, rock candy, a decoction of rice, etc.

PRACTICAL USE OF THE ABOVE MENTIONED SUBSTANCES.

Whatever the substances may be which are employed for fining wine, the mode of operation is as follows: After the material has been previously prepared, according to its special character, the bung is taken out of the cask and about two and one half gallons are drawn off by means of a siphon or other appliance; then the finings are introduced in the cask through the bung-hole and the wine well stirred, either by a specially constructed instrument or by a stick which has been split into four parts at one end. When the substance is thus well mixed with the liquid, the wine, which had been first drawn off to facilitate this operation, is poured back into the cask. Nothing remains now to be done but to fill the cask accurately, bung it up, and let it rest.

It is not possible to state the precise length of time which is necessary to obtain a perfect clearing; this depends from the finings that have been used, their quantity, the quality of the wine which was subjected to the treatment, the greater or less uniformity of the temperature of the cellar, etc. In most instances, particularly if it is possible to maintain a uniform temperature in the cellar, it is advisable to allow the wine to rest for a fortnight or month before drawing it off. This length of time is most favorable to effect the clearing. For it has been noticed that if the wine is left a longer time in contact with the finings, there is danger that it may become turbid again and acquire a foreign taste, particularly if the lees should rise again owing to after-fermentation, or to expansion of the liquid. Besides, a prolonged contact of the lees with the clear wine can impart to it a disagreeable taste from mere contact, often without any turbidity having been noticed; this experience has been had with wines that had remained in contact with the finings for six months. If there is some hurry about sending off the wine, the process of fining should be watched from day to day, so as to rack the wine as soon as it has perfectly cleared. If the wines under treatment are in a cellar which does not have a constant temperature, particularly during very warm weather, the same precautions should be taken; also the temperature of the cellar should be lowered by the various means which we have mentioned in the first chapter. As soon as the wine has cleared it should be drawn off from the lees.

FININGS WHICH EXERCISE A MECHANICAL ACTION—FILTRATION.

As these substances (gray paper, fine siliceous sand) are neither dissolved, attacked, nor coagulated by any of the constituents of the wine, they effect its clearing by a kind of filtration; in passing through the liquid they carry down a part of the insoluble matters which they meet on their way; but it is seldom that by their use a perfectly bright condition of the wine is obtained. They should be used, therefore, only where other methods cannot be applied.

As far as the filtration through strainers is concerned, this method makes it possible to obtain perfectly clear wines. There is, however,

the drawback that, owing to the prolonged contact with the air, the wine becomes flat, loses some of its bouquet and flavor, particularly its fruity taste and oily consistency, and decreases also in alcoholic strength. Apart from these deteriorations, the filtration requires, in order to be carried on in a satisfactory manner, more manual labor than any other method of fining. It is, therefore, employed only in exceptional cases when it is impossible to use other methods. On board ship, for instance, where the pitching and rolling make all other methods impossible, filtration can be very useful. The same may also be the case when it is desired to send off the wine bottled as quick as possible; in this latter case the access of the air should be particularly avoided, and the whole work should be done rapidly.

Gray Paper Converted into Pulp—Preparation.—From five to ten leaves of paper are taken, torn to pieces, and soaked in half a gallon of wine, and afterwards converted to a pulp, first with the hands and afterwards with a pestle or a piece of wood; when the whole has acquired the desired degree of fineness, it is poured into the cask which is under treatment.

Fine and Siliceous Sand.—White and very fine sand is chosen, washed, and freed of any foreign matter it may contain. It is used in quantities of from one to two fifths of a gallon per barrel.

Filtration through Strainers.—For the purposes of filtering, strainers are used, made of different materials, such as wool, felt, unbleached cotton, etc. Woolen strainers should be chosen when large quantities have to be filtered; their form is conical and similar to that of a conic sugar loaf. (Fig. 128.) They are fixed by means of strings either below the tap or somewhere else, but always in such a way that it should be possible to place below them the vessels which are destined to hold the filtered liquid; they are kept open by adjusting a hoop to their orifice by means of strings. If the material of the strainer is easily permeable, it is necessary, in order to make the straining complete, to use gray or white unsized paper (filter paper) which has undergone the following treatment: Take two sheets of the paper and reduce them with some water to a pulp; mix this pulp very thoroughly with, say, two and one half gallons of wine in a jug. Pour, quickly, the turbid wine on the strainer, and introduce the pulp only when the filter is almost full. The first liquid which runs through the strainer is always turbid; filter it again until it is perfectly transparent. Take care to keep the filter always full to the same level, so that the pulp which sticks to its sides should not be displaced.

By means of a specially constructed wooden or tinned copper filter the operation may be carried on more protected from the access of the air, and also more rapidly. In this case the shape of the strainers is not the same—they form an oblong oval whose one end is tied to the lower end of a tube, and the produce of the filtration drops into a closed receiver. The whole operation becomes thus, with the help of the funnel which fits in the upper end of the tube, much easier, more effective, and more rapid. These filters, of which a drawing is given in Fig. 130, can be made, according to their diameter, with one, three, and even twelve tubes. In order to use them they are provided with strainers, which are tied to the tubes; the tubes are closed with cork stoppers inside the funnels. After the paper has been prepared and mixed with several gallons of the wine which has to be filtered, the funnel is filtered, and then the tube is opened. The turbid liquid fills and inflates a strainer; now the chief

stopcock, is opened in order to pour back the turbid liquid; then several gallons of the wine containing the paper are rapidly emptied, and the shredded paper does not fail to cover the interior of the strainer; the liquid is repeatedly poured back into the funnel until it is perfectly transparent. When this stage is reached, it suffices to add new liquid in the strainer, and when the latter has become too dirty another tube is opened and a second strainer is started exactly in the same way and without any necessity of displacing or changing anything.

ALKALINE FININGS.

Calcined and Powdered Pebbles, Calcined Oyster Shells, Powdered Marble, Chalk, Alabaster, Wood Ashes.—These alkaline materials combine with the acetic acid, the tartaric acid, etc., which are contained in the wine, and form thus salts (acetates and tartrates of potash or lime). a part of which remains in the liquid in suspension, producing turbidity and making the wine less wholesome.

The particles of these alkaline substances which are not attacked by the acids of the wine, exercise a mechanical action, which is analogous to that produced by sand; they sink gradually to the bottom of the cask, and carry down with them in their course a part of the impurities that are contained in the wine. The quantity of these materials that should be used is one quart per barrel.

These substances have been sometimes used, mixed with gelatine, for fining wines which do not contain tannin. In this case only one third of the usual quantity is used. A simple addition of tannin is much preferable.

It is evident from what we have said already that this method should be rather avoided. We shall have, in speaking of faulty wines, an opportunity to discuss more fully the effect of alkaline substances on musts and wines.

ALBUMINOUS FININGS.

Fresh White of Egg.—Albumen is an organic matter which is contained in the white of eggs, in the blood of animals, and in milk. Its constituents are (in parts by weight): Carbon, 53.33; oxygen, 23.70; hydrogen, 15.50. Thus it differs from gelatine only by the relative proportion of the constituents. This substance, which is fluid, is soluble in cold water. It coagulates at a temperature below 122 degrees Fahrenheit. It is *coagulated also in the cold* by alcohol and tannin. These properties are utilized in the process of fining dry and sweet wines, cordials, and syrups. To fine liquids which stand easily a higher temperature (as, for instance, the syrups), albumen is dissolved in the liquid cold; then the whole is gradually heated; the heat coagulates and unites the molecules of albumen which are suspended in the liquid, expands them, and makes them specifically lighter; they rise to the surface of the liquid, and carry with them the impurities which they meet.

If the albumen is dissolved in cold alcoholic liquids, it is coagulated by the alcohol and tannin which are present. It forms a kind of network, which has a higher specific gravity than the wine, and sinks by its own gravity to the bottom of the cask, carrying down all matters in suspension.

Pure albumen is contained in the white of egg. According to M.

Payen, there are $12\frac{1}{2}$ to 30 per cent of albumen in the white of egg. This albumen is liquid and inclosed in very thin-walled cells. This kind of tissue imparts to the albumen a gelatinous consistency. By suspending the white of egg in water, and heating the liquid, the walls of the cells are destroyed, and a clear solution is obtained.

For one barrel of wine the whites of six to eight eggs, on the average, should be used. These are beaten with about half a pint of the wine under treatment, and afterwards filled into the barrel.

The soundness of the eggs should be always ascertained by holding them to the light before breaking them. This precaution is very important, for it becomes evident that one rotten egg is more than sufficient to impart a disgusting taste to a barrel of wine.

If the wine under treatment is not of high quality, is young, very turbid, and does not clear easily, the white of eggs should be dissolved and beaten in one pint of water, in which a handful of common salt has been dissolved. The object of this addition of salt is to give more weight to the albumen, also to increase its density, and to precipitate it quicker to the bottom. We do not, however, advise the use of salt water, except for ordinary and very turbid wines. To experiment with it on first-class and old wines, should the alcohol-percentage of the wine be very low, an addition of one or two quarts of brandy to the barrel will promote the coagulation of the albumen,

ALBUMINOUS SUBSTANCES WHICH ARE NOT ENTIRELY COAGULATED.

Fresh or Dried Blood.—According to Riffault, the blood contains usually three parts of serum and one of cruor. The serum does not contain gelatine, but a great deal of albumen. The cruor contains insoluble fibrine and a soluble coloring matter. The blood can therefore be used for fining instead of albumen, as it contains a good deal of albumen; but the blood of the ox, of the cow, or of the sheep, has a smell and a taste which is not agreeable. The blood of the hog is the best for this purpose. It is important that the blood should be odorless and tasteless, because it is only partly coagulated by the alcohol contained in the wine. Thus its aqueous part remains mixed with the wine, and is liable to impart to it a disagreeable taste and smell, which disappears only after a long time. For these reasons the use of blood for purifying old and fine wines should be avoided. The quantity which is usually employed is one quart per barrel, well mixed with one quart of wine or of salt water.

Milk.—Cow's milk contains, according to M. Payen, in one hundred parts by weight: water, 86.50 parts; nitrogenous matter (caseine albumine matter, soluble in alcohol), 4.30 parts; lactose (milk sugar), 5.20 parts; butter (or fatty matter), 3.70 parts; insoluble salts, 0.20 parts; soluble salts, 0.10 parts. One can see from this enumeration that the milk cannot be completely coagulated by the alcohol which is contained in the wine. The whey, or the watery part, remains in solution, and the milk sugar may give rise to an undesirable after-fermentation. The use of milk should be, therefore, avoided in the treatment of fine wines. The milk also exercises a discoloring action, and can be used for bleaching russet white wines. The quantity to be used is one quart per barrel, and it is poured in without mixing it previously, either with wine or with water.

The freshest milk should be used; for milk which is older than twenty-four hours can easily, particularly in summer, acquire acidity, which would be imparted to the wine. Milk has an alkaline reaction, and may thus be useful in diminishing the acidity of faulty wines, clarifying them at the same time (compare *Acidity*).

GELATINOUS SUBSTANCES.

Gelatine.—Gelatine is an organic substance which is chiefly contained in the sinews and in the hide of animals, in the bones and in certain parts of the body of fishes; it is extracted from these different materials by prolonged boiling with water. According to Gay-Lussac and Thénard, it contains (parts by weight): carbon, 47.881; oxygen, 27.207; hydrogen, 7.914, and nitrogen, 16.99.

Gelatine is susceptible of assuming, on cooling, an elastic consistency, and of becoming liquid again on heating; this is what distinguishes gelatine from albumen, which, on the contrary, is liquid in the cold and is coagulated by heat, without possessing the property of becoming liquid again on cooling.

Gelatine is soluble in water; it is precipitated by tannin, and on the other side tannin which is dissolved in a liquid is precipitated by gelatine; thus the two substances, by forming an insoluble compound, carry down with them the matters which are suspended in the liquid. On this quality the use of gelatine in the fining of wines is based. If tannin is present in the wine only in small quantities, the whole quantity of gelatine which was added will not be precipitated, and will thus remain in solution; in such a case it will be necessary to add some tannin to the wine in order to facilitate the precipitation of the gelatine (compare composition of the wines under the head of *Tannin*). It is possible, however, to precipitate the gelatine without the help of tannin by adding to the solution of gelatine just before using it alkaline substances, such as ashes, soda, lime, chalk; but these substances, though they increase the effectiveness of the gelatine, are objectionable, and we have already considered their action on wines.

Gelatine, of all the chemical finings, is the one which is most efficient if the wine contains sufficient tannin to precipitate it in full. But the loss of tannin is injurious to the keeping qualities of the wine (compare *Composition of wines*), and the gelatine which is used to fine red wines, precipitates, together with the tannin, a considerable part of the coloring matter with which the tannin is intimately combined. For this reason gelatine should be used in the treatment of red wines, only when it is desirable to diminish their harshness by removing the excess of their tannin and of their color; in one word, gelatine should be used when it is desired to age a wine. The utility of gelatine in the treatment of ordinary white wines cannot be denied. Should it now and then happen that a white wine does not clear on being treated with gelatine, one hundred and fifty to three hundred grains of tannin should be added to each barrel, so as to make the precipitation of the gelatine more complete. Nevertheless, we advise treatment of the finer white wines, of a mellow character, rather with pure albumen than with gelatine, in order to avoid an excess of precipitation, which would possibly carry down also the sweetish matters contained in the wine.

Preparation.—In commerce, the gelatine is found in tablets. One

tablet per barrel is used, and even two, if a very thorough clearing is desired. The gelatine is gradually warmed with one pint of water per tablet. Great care should be taken to stir continually, in order that the tablets should not stick to the bottom. The vessel is taken from the fire as soon as the gelatine is dissolved, which is done without the necessity of boiling. Boiling should be, on the contrary, avoided. Gelatine dissolves easier if it has been previously soaked in water for some hours.

Isinglass.—This isinglass is extracted from the air bladder of the sturgeon. It contains a large amount of gelatine, and, like the latter, is precipitated by tannin. It does not require, however, much tannin for its precipitation. It contains exceedingly tenuous membranes, which exercise a mechanical action, and are precipitated by their own weight. To prepare the fish glue for purposes of fining, the leaves of this material are beaten on a block and cut into as small pieces as possible. One and three quarters ounces for each barrel are soaked cold with half a pint of white wine during twelve hours. When the glue is thus almost dissolved, it is pressed repeatedly between the fingers, and a quarter of a pint more of white wine (per barrel), or in winter, water (warmed to 122 degrees), is added. After that the mixture is strongly beaten with a small broom, and the pieces of glue which have not dissolved completely are kneaded with the hands until they do so; then, the whole is passed through a sieve. For further use it is diluted with one pint of white wine per barrel.

DIFFERENT OTHER SUBSTANCES WHICH ARE USED FOR PURPOSES OF FINING.

Decoction of Animal Sinews.—By boiling for twenty-four hours in water, sheep's or calves' feet, heads, etc., a liquid is obtained which, on cooling, solidifies to a jelly which contains a large quantity of gelatine, and which can be used for the same purposes as gelatine if, before being dissolved a second time, it is first dried in a warm place. Only fresh materials should be used, else there is danger of imparting a bad taste to the wine.

Glue.—Glue, which is prepared from the refuse of slaughter houses, imparts often to the wine a disagreeable taste, and should be used only when no other materials can be obtained. The quantity employed for each barrel is eight and three quarters ounces, which should be dissolved in one pint of hot water. This liquid is added to one quart of the wine, and then poured into the cask. This glue is, like gelatine, precipitated by tannin.

Gum Arabic, Powdered Rock Candy, Starch, Decoction of Rice.—Powdered gum arabic as well as rock candy are not rapidly and completely precipitated, and the amount which remains dissolved in the wine gives rise to after-fermentation. This is a very poor process. The quantity required is six ounces per barrel. Starch dissolved in hot water and a decoction of rice and of flour have been sometimes used as finings. Their use is based on the fact that starch and gluten are precipitated by tannin; but the precipitation is not a complete one, and these substances introduce into the wines harmful ferments. The quantity used is one quart of the decoction per barrel; this quantity is mixed with one quart of the wine and then poured into the cask.

RECAPITULATION.

The Best Finings.—The best finings are those which remove the suspended matter in the wine, without leaving a soluble residue, without imparting a bad taste to the wine, and without exercising any action on the chief constituents of the wine. All these conditions are fulfilled by pure albumen or fresh white of egg.

Pure gelatine and isinglass do not leave soluble residues in the wine, but they possess the disagreeable property of precipitating the tannin and a part of the color. For this reason they should not be used with red wines, unless the wine is a poor one, or economy is an object, the price of these materials being lower than that of fresh eggs. For ordinary white wines, whose alcohol-percentage is low, they are the best finings. With the help of tannin, which is added to the wine, a perfectly bright condition is obtained. But those white wines of highest quality, which have a high alcohol-percentage, should be rather treated with albumen, which does not take away so much of their flavor as gelatine does.

All we have said makes it evident how important it is to be posted on the action and nature of the finings which are generally used. It is consequently impossible for us to speak without being prejudicial to the vendors of the various compositions met with in commerce under different names, *and without designating the substances which enter their composition.* Besides, these substances are mostly composed of what we have described above.

It should be added that, when it is necessary to clarify *fine* and *high priced* wines, it is important that the foreman of the cellar—who is responsible for the work—or the proprietor, should know and select the substance according to the character of the wine which has to be fined. Under no circumstances whatever should he use substances with whose composition and action he is not perfectly familiar.

CHAPTER III.

SPECIAL TREATMENT OF VARIOUS KINDS OF WINES.

Treatment of young red wines. Treatment of old red wines. Treatment of white wines. Racking.

TREATMENT OF YOUNG RED WINES.

We have already spoken, in discussing the drawing off of the must from the pomace, of the inconveniences which result from performing this operation either too early or too late. Let us suppose, therefore, that the wine has been drawn off and filled into casks, an operation which may be performed in two ways: Either the casks are placed directly under the tank or the wine is drawn off into a tub and carried in buckets to the cellar. Here it is poured through funnels into the casks, care being taken to distribute each drawing in equal parts through the casks required to receive the contents of the several fermenting tanks, in order that a homogeneous wine should result. Before entering into details we desire to call attention to a widespread error as

to the amount of labor and attention which should be bestowed on the wine. Many wine makers and coopers think they have done all that can be done for the wines which are in their charge if they have filled up the casks and racked at periods which are fixed by tradition; but whosoever has experience in the business knows that it is impossible to state precisely the time when racking is necessary. Intelligent care, frequent and timely racking are required to preserve the wine from injurious alterations, which can be produced by various causes. Thus, even if a wine is racked at certain periods, this does not mean that everything required has been done for it; for perhaps the other precautions have been neglected, which its nature, its composition, the cellar in which it is placed, and the alterations which it may possibly undergo, make necessary.

Young wines, after having been pressed, have, as a rule, not completed their fermentation, and though they may not contain any quantity of sugar which is either appreciable to the taste or to the spindle, they continue to ferment in the barrel. Under such circumstances, a small quantity of alcohol is formed by the transformation of the small amount of the fruit sugar which remains in the wine; but this after-fermentation is not always a vinous one, particularly if the first fermentation has been well conducted. Sometimes the pricking taste which the wine retains some days after having been pressed, is mostly due to carbonic acid, which is gradually given off. The wine should be attentively watched at this time, and the casks should be bunged hermetically as soon as the after-fermentation is over—that is, when the wine has lost the pricking taste which is due to the presence of carbonic acid, and when no more of this gas escapes through the bunghole.

As soon as the casks are filled, they should be placed on racks, or on blocks of wood, and be bunged; then the bung is taken out again and some more wine added, so that the cask is filled up to the bunghole. When this is done, the bunghole is covered with a flat piece of wood, or with a new bung, which is placed loosely on the bunghole, with its thicker end downwards, or with vine leaves loaded down with sand; thus the casks are only loosely closed, so that the carbonic acid gas may easily escape. Every two days the casks are filled up to the bunghole with wine from the same vintage, to make good the loss by evaporation. There are also used for young wines, which are still fermenting, various other kinds of bungs, which allow the passage of the gas through a small aperture; but these bungs are objectionable, because they also give access to the air, and moldiness sets in as soon as the liberation of carbonic acid gas has ceased.

The wine should be tasted each time the filling is done; and as soon as it is found that the after-fermentation has stopped and no more carbonic acid is liberated, the casks should be solidly bunged with ordinary bungs. The best for this purpose are conic bungs made from oak and carefully turned. From now on the cask should be filled up at least every eight days.

The young wines are sometimes turbid on leaving the fermenting tank, particularly if they have been drawn off at other than the right time.

The filling up of the barrels is very simple. For this a vessel is employed specially prepared with a hooked nozzle, for casks filled up with this utensil so as to partly cover the bungs causes some loss of

wine to take place, particularly in the hands of untrained workmen, owing to the difficulty of seeing if the cask is full. These losses can be avoided by using the funnel shown in Fig. 16.

When the wines which have been made from perfectly sound and ripe grapes have been pressed, and when the violent fermentation is over, if the pressing has been done at the proper time, they are almost clear, though during the tumultuous generation of carbonic acid they were turbid. This first natural clarification is due to the formation of insoluble compounds, consisting of organic albumen, tannin, pectine, etc., which are coagulated or precipitated by alcohol; but it is chiefly due to the cessation of the ascending movement of the bubbles of carbonic acid; the latter, by rising from the wort to the surface, carries up and leaves in suspension a number of foreign substances, such as particles of the skins, seeds, coloring matters, organic salts, and particularly a great deal of salts of tartar. When the violent evolution of carbonic acid ceases, a part of these matters sink to the bottom of the liquid, owing to their gravity, and thus a mechanical and chemical clearing results. The latter is due, as we have already remarked, to the chemical reactions which go on between the various components of the new wine.

As long as a visible fermentation goes on, and as long as carbonic acid is evolved, the lees, which are formed by the insoluble matters, do not settle to the bottom of the casks, but remain in suspension. This is the reason why the wines become turbid, and that often they are less clear several days after than immediately after having been pressed, but as soon as the fermentation is over a more or less complete precipitation of the first lees, called *bourres*, is effected. These lees contain a great deal of ferments, of tartrates, of insoluble coloring matters, and other salts.

As soon as the after-fermentation has ceased, and the wine has become clear, it is advisable to rack it off as soon as possible from the first lees, in order to preserve it from the action of the ferments, which are contained in the latter. This first racking cannot be done at any fixed time. The period depends upon the nature of the wine, the temperature of the atmosphere, etc. Generally, when a wine is well made, the fermentation ceases entirely during the month of November; it clears then, and can be racked for the first time in December.

We have repeatedly observed that wines which have been racked with care as soon as the fermentation has stopped, and as soon as the first lees have been deposited, are less liable to undergo an after-fermentation than those which have been allowed to remain on the lees until spring-time, and that they become perfectly clear with the least difficulty. This fact may be explained thus: By the end of November, and in December, the temperature sinks gradually, and exercises on the wine a contracting influence, thus facilitating clearing and precipitation of the insoluble matters. If, on the contrary, the first racking is done as late as March (the time when generally the first racking is done), the wines may experience a slight after-fermentation before the racking. This after-fermentation is due to the presence of ferments in the lees. At this time of the year, the gradual rise in the temperature expands the wines and disturbs the lees, of which the lightest particles mix with the wine and produce turbidity. Under such circumstances the wine is racked off in a turbid state, holding in suspension a quantity of ferments; then it becomes difficult to clarify the wine and to preserve it

from secondary fermentation. Sometimes, even, it assumes a disagreeable taste of lees. These accidents can be avoided by racking the first time in December, and by finishing the spring racking before the temperature has risen considerably—for instance, during the month of March.

The barrels containing the new wines should rest in the warehouse until the autumnal equinox which follows the vintage, *i. e.*, until September. They should be kept hermetically bunged and always full. They should be filled once every eight days in close cellars, and twice a week in ventilated cellars, in which the evaporation is considerable. At any rate, it should be ascertained if the wine is inclined to moldiness or not, because in this case it would be necessary to fill up more frequently. To prevent moldiness it is best to bung the casks very carefully. If the casks are piled in single tiers they are filled up by means of the ordinary filling-pot; but if they are stacked high care is taken to use long bungs in order to make it easier to take them out, and the filling up is done with the help of the pot and of a bended funnel in the shape of a Z. This funnel, which is called a Z funnel (see Fig. 16), is arranged in a manner such that near its end can be fixed a piece of candle, destined to light the bunghole. The linen which is used to wrap the bungs should be kept clean and renewed as soon as it becomes dirty or acquires an acid odor.

By smoothing and rounding out the bunghole well, and by using long bungs, which are carefully turned, it is possible to bung hermetically by hand without the necessity of wrapping the bung in linen.

After the first two rackings of December and of March, the wine is racked a third time in the month of June, and for the fourth and last time during the autumnal equinox. Afterwards the casks are permanently bunged and placed with the bung sidewise. From this time the wines should be treated as old wines.

These prescriptions apply to the wines which are stored in close cellars and to wines which do not “work;” and, indeed, some wines are liable to set in “working,” even when the after-fermentation is over, notwithstanding they may have been repeatedly racked. This happens particularly with wines which have been moved, shifted, transported without having been racked at all, and also with those which are stored in cellars whose temperature is not constant. In the first case, the after-fermentation should be prevented by timely racking; the condition of the wine should be also ascertained by frequent tasting.

In summing up, the treatment which should be bestowed on new wines consists:

1. In placing in well-hooped casks, with loose or open bung, in close cellars, and by filling them up constantly and regularly with wines of the same character.

2. In racking the new wine from the first deposit of lees as soon as the after-fermentation is over and as soon as it has cleared; that is, toward the month of December, and in racking again before the spring equinox, again toward the summer solstice, and during the autumnal equinox.

3. In preventing after-fermentations by racking each time when it is found on tasting that the wine begins to “work.”

If the wine is clear the use of finings should be avoided, in order not to diminish the fruity taste; but if it remains turbid after the second racking it should be treated with white of egg after the third racking,

and the wine should remain the shortest time possible in contact with the finings.

By such a treatment, clear wines without tendency to working can be obtained, which, if they are wines of the highest quality, will keep their fruity taste. On the contrary, if the young wines are allowed to "work" after their after-fermentation is over, they lose their fruity taste, their mellowness, and become dry. To avoid this dryness, which is produced by the working and which decreases considerably the value of the wines, particularly of the fine wines, the casks with wines which date from hot years should not be placed with the bunghole sideways after the June racking, for at this time of the year the expansion resulting from the rise of temperature may set the wines to fermenting.

For the same reasons the wines which have to be sent off before the regular time of the first racking should be racked from the first deposit of lees as soon as they have become clear, because if the lees mix again with the wine the latter becomes disposed to undergo after-fermentations, and thus loses its mellow taste.

During the first year the wines lose by evaporation twice as much as they lose when they are old, and the amount of labor they require is three times as great. Even if they are placed in cellars which are very well protected from the access of the air, the losses which are occasioned by evaporation, filling up, and racking may reach the 8 per cent provided for by the law.

In filling up the casks which are stacked up, by means of the Z nozzle or funnel, it happens frequently that a few drops run out of the bunghole. The small losses which occur every time when the barrel is filled up increase the total waste considerably by the end of the year.

In the cellars of northern France—as, for instance, in Paris—the barrels with the young wine are not kept full. As soon as they arrive they are stacked up in tiers just as if they were old wines. Not infrequently the bung is left undisturbed, and perhaps on the side; and in order that the casks should not be bursted by the working, a gimlet hole for vent is bored in the upper part of the bulge and left open. This method is an extremely poor one, because the contact with the air changes the wine, makes it flat, and produces after-fermentation.

TREATMENT OF OLD RED WINES.

One-year old wines are treated, after the autumnal racking, like old wines.

If their taste is frank, if they are clear and not "working," the casks are completely filled, bunged, and placed with the bunghole sideways in the cellar (see *Cellars*).

If they are faulty, turbid, or if they are "working," the faults with which they are affected should be first treated in an appropriate manner (compare *Faulty wines and Clarification*). But if the wines have been treated with care as long as they were young they are rarely faulty, unless the cellar in which they have been placed subjects them to sudden changes of temperature.

In perfectly air-tight cellars the old red wines which have a frank taste, which are clear and not "working," and which are preserved in strong casks carefully hooped with iron, require only two rackings a year; the one in March before the spring equinox, and the other in September

at the time of the autumnal equinox; unless, from whatever reason it may be, they lose their bright condition by again beginning to "work;" this can be ascertained by tasting them from time to time. In this case it would be necessary to rack them immediately, and to use finings. We should avoid leaving an empty space in the casks with old wine, either by taking samples frequently or by tasting too often. Thus, as soon as there is an empty space in a cask, owing either to one of the above reasons or to a leak, even if the deficiency amounts to not more than half a gallon, the wine should be drawn off immediately in order to avoid the pernicious influence of prolonged contact of the air with its surface. The rackings should be more frequent in cellars which are not close, and where the evaporation is greater, in order to prevent the wine from becoming flat or acid, or liable to undergo after-fermentation.

If all these prescriptions are carefully observed, the wines will improve and develop all the qualities they are able to acquire, according to their nature. The greater or less excellency which the wines acquire by aging under favorable conditions, is due to two chief reasons. The first is the separating out of the coloring matters, and of the various salts which are dissolved in the young wines, and which become afterwards insoluble by the formation of new compounds, which, in their turn, are removed at each racking with the lees. The second reason is the transformation of the tannin, which gives a certain harshness to the wine, into gallic acid. It is then precipitated through the formation of insoluble compounds with certain substances that are contained in the wine and in the finings. The result is that the old wine loses some of its original color and soluble salts, and a large quantity of tannin; its taste becomes, therefore, finer; its flavor, which was hidden by these substances, comes into greater prominence, and the bouquet, which chiefly consists of ethers, begins to develop; the mellow taste is also more decided. These observations apply chiefly to wines of the highest quality, because many of the ordinary wines lose the fruity taste which they had when they were young before the end of the first year. This is due to the fact that the mucilaginous substances and the pectine, which impart the mellow taste, are precipitated with the lees or destroyed by the after-fermentation.

Generally these wines are lacking in strength, body, and tannin, and many among them show besides a great tendency to lose their color. The time required for a wine to reach the highest degree of excellency which it is able to attain in the barrel, is not the same for all; thus, certain strong and harsh wines require much more time than the delicate wines. On the average, those Medoc wines which are the lightest in body attain the completion of the natural clarification towards the end of the second year. If they are kept longer in the barrels they lose their mellow taste. The wines from the same region, which, on the contrary, are strong and full-bodied, should remain one year longer in the barrels, in order to reach perfect maturity. Certain wines, with a very large amount of tannin, take a long time to develop perfectly, but they keep, also, much longer.

When the wines have reached their full maturity, and when no more lees are separating out, they should be bottled, else they lose their good qualities. In the bottles they complete their maturing; they acquire bouquet and preserve at the same time their mellow taste, while in the

casks they lose in the end their fruity and velvety taste and become hard and dry.

One should be a connoisseur in wines and have a certain knowledge of the wines which are under treatment in order to fix the time which is best suited for bottling. We shall mention the details of this matter in the chapter on the *bottling of wines*.

What we have said of old wines may be summarized as follows:

1. They should be stored in perfectly close cellars, and before they are placed with the bunghole sidewise it should be ascertained that they are perfectly bright and free from defects.

2. The lees which separate out should be removed by careful racking every half year; the casks should be always kept full, and after-fermentations should be prevented by attentively watching the wine, and racking when necessary.

3. The loss by evaporation should be reduced to the smallest possible amount, by keeping the wine close in cellars and in strong, iron-hooped casks.

4. The wine should be bottled before it has lost its fruity taste, and as soon as the lees have completely settled down. By following these prescriptions, it will be possible to make a wine acquire, in due time, all of the qualities possible.

But if the cellars are not tight, if the evaporation is considerable, and if empty spaces are left in the casks by taking samples too often, or if racking is not done frequently enough, the wine is liable to set in working, and become hard, to lose its mellow taste, and to undergo a slight change, which is due to the presence of acetic acid, formed by contact of the wine with the air.

TREATMENT OF WHITE WINES.

As the fermentation of the white wines is going on in the barrels, their treatment begins as soon as the must is in the barrels, in which they are filled without any preparatory operations as soon as they have left the press. In each barrel a more or less violent fermentation sets in, according to the quantity of grape sugar present, and to the temperature of the must and of the surrounding atmosphere, etc.

We know that there exists three kinds of white wines; the differences between them are produced by the greater or less amount of sugar in the must, by the different methods of vinification, by the variety of grapes used, etc.—there are the dry white wines, the mellow white wines, and the sweet white wines.

There are besides, *sparkling* wines, which are made from red and white grapes; but we are going to speak of them in a special chapter. The care which should be bestowed on the white wines begins, as we have already said, as soon as the must has left the press and has been transferred to the barrels.

The barrels are filled only up to two inches from the bunghole, in order to leave room enough for the expansion which is produced by the bubbles of carbonic acid, generated as soon as fermentation has started. If this precaution is taken all loss of must is avoided.

The violent fermentation begins after the first twenty-four hours. As soon as it has started in violently the foam which rises to the surface of the liquid is made to run down the walls of the keg by filling up every

day with must of the same character; the bungholes are left open from the start. The method which consists in making the foam flow out of the barrel in proportion as it rises to the surface of the wine—a method which is different from that of fermenting in tanks or in partly empty barrels, when the lees remain in the wine—is used in the fermentation of the high quality wines of the Gironde, such as Barsac, Sauternes, etc. The method is based on the principle that the removal of this foam, which consists partly of ferments, produces a kind of a purification by carrying out of the barrel with it some of the injurious matters.

The result is that the lees are less voluminous and that the fermentation lasts a longer time. The wines which are made according to this rule retain the mellow taste better than those (the specific gravity of the must being the same) which have been fermented in partially filled kegs. The explanation of this is that in the former case a small quantity of mucilaginous substance escapes the action of ferments, while in the other case the fermentation is more energetic, all of the sugar is transformed into alcohol, and such wines are therefore dry and less agreeable to the taste.

Therefore, the first violent fermentation of white wines which are destined for further use without previous blending or any other operation, should be conducted in completely filled kegs. As far as the white wines are concerned, which are destined for concentration by heat or for blending, these fermentations should be conducted in partially filled barrels or in covered tanks, so that the foam and ferment should remain in the wine until the fermentation is over, in order to give increased activity to the latter, and to insure the complete transformation of all the sugar present into alcohol.

As soon as the fermentation of the white wines becomes less violent, and no more foam is produced, the bungholes are covered loosely with a piece of wood, so as to give an outlet to the carbonic acid gas, and the barrels are filled up every two days. At last, when the evolution of carbonic acid has stopped, the barrels are hermetically bunged, and once or twice a week filled up according to the greater or less rate of evaporation. The wine should be racked as soon as the lees have settled and its condition has become bright; in this respect no time can be fixed, because the duration of the fermentation of the white wines depends chiefly upon the specific gravity of the must and upon the temperature of the atmosphere; at any rate, it lasts much longer than that of the red wines. It often happens that the fermentation is not over before the month of February, particularly that of wines which are very rich in sugar, such as the Sauternes, and particularly if the end of the autumn is cold; while the wines which come from the same vineyard, and which are made under the same conditions, but which contain less sugar, will be through with their fermentation in December. Moving the white wines in the course of fermentation should be avoided, particularly when the lees begin to settle, because, by mixing them again with the wine, the fermentation is rendered more active, and the mucilaginous substances are destroyed, by transformation into alcohol. Consequently, the mellow taste, which gives to the white wines their value, is lost. Such are the precautions which should be exercised during fermentation; the latter, it must be added, can be stopped, delayed, or prevented at liberty, by the use of sulphurous acid gas, according to which kind of wines are desired—sweet or dry ones

(compare Manufacture of preserved musts). If the sweet white wines have less than 15 per cent of alcohol, they are liable to undergo fermentation.

It is possible, by treating the white wines with sulphurous acid, to maintain them sweet from one vintage to the other, even if they are made from rather weak musts; but it is not possible to obtain this result with such musts, unless they are repeatedly treated with sulphurous acid, and protected from the access of the air; and in such a case the wine is liable to acquire the taste and smell of the sulphurous acid; besides, when strict watch is not kept over them they begin to ferment. In order that white wines which are treated in the usual way should preserve their sweetness, it is necessary either that the musts should be very rich in sugar (16 per cent to 20 per cent) or that they should be fortified so as to contain 15 per cent to 18 per cent of alcohol after their fermentation is over. But this method of fortification is only used in making the sweet wines. We shall speak of it more explicitly in the chapter on *Sweet wines*.

The white wines which are destined to be used when they are still sweet are transported either in form of must, which has been lately pressed, or during their most violent fermentation. If the must has been sent off without the fermentation having started, the latter begins on the way, and becomes violent, owing to the motion of transportation, particularly if the temperature is high, if the voyage lasts several days, and if no sulphurous acid or artificial finings have been used. Even the treatment with finings alone, without the help of sulphurous acid, makes the fermentation of a must less violent. (Compare Classification of unfermented wines.)

In order to prevent the bursting of the bottom of the casks through the generation of carbonic acid and the expansion of the liquid, a small hole, which affords an outlet to the gas, is bored near the bung-hole. Now, in order to avoid the wines flowing out in rolling the cask, a tin button is introduced in this opening which is retained in the stave by a stem of the same metal. This stem is bent on the inside of the stave so as to allow the button to rise a little and give an outlet to the gas. Instead of this button with metallic stem, three or four straws with their ears yet on, may be introduced in this opening; the ears remain outside of the stave and do the same service as the button.

Notwithstanding these precautions, there is great loss connected with this manner of transporting white wines, particularly if the men in charge do not watch carefully to see that the fermentation goes on freely in each barrel, and that the latter should be always placed with the bung-hole right side up.

Care should be taken not to transport white wines of high quality, and generally, all the sweet or simply mellow wines which retain a part of their sugar in aging, as long as they ferment. There are two reasons for that: the first is that the fermentation, stimulated by the ferments and the first lees which have already settled and now rise again, is liable to become too violent (particularly if the wines had less than 15 per cent of alcohol), and that thus the mucilaginous substances are transformed into alcohol, making the wines dry and difficult to clarify; the second is the great amount of losses which result from the transportation of the wine in this condition.

Racking.—After the first violent fermentation of white wines is entirely

over, and as soon as they have become bright, they should be racked, particularly if the temperature is rising. It should be mentioned here that the less grape sugar a must contains the sooner the wine becomes bright, for the fermentation of the musts which contain little sugar is more rapid than that of musts which are rich in this ingredient.

The most favorable time for the first racking is the month of February, before the rise of the temperature makes the wines expand and which raises the lees.

In racking it is strictly necessary to avoid contact with the air and to fill the wine into strongly sulphured kegs.

The care which should be bestowed on a white wine after its first racking varies according to the quality of the wine.

If we have to deal with ordinary dry wines, that is, with wines whose sugar has been entirely destroyed by fermentation and changed into alcohol, they should be treated in the same way as new red wines.

But the mellow white wines, that is, those which retain still some sugar after the first violent fermentation is through, require (particularly if they don't contain fully 15 per cent of alcohol) minute watching in order to preserve their mellow taste in aging, for if they are left to themselves they undergo a second fermentation and become dry.

In order to age without losing their mellow taste, these wines *should be protected from any after-fermentation*, and should be classified and freed from their ferments by the use of as little as possible of *finings or filtration*. *Both of them diminish the mellow taste*. To attain this object, the following conditions should be fulfilled: The wine should be—

(1) Placed in perfectly close cellars of uniform temperature, and the kegs should be strong and hooped with iron.

(2) The barrels should be hermetically bunged, and always filled up to the bung with bright wines of the same quality and of the same temperature.

(3) Cleared, preserved from after-fermentation, and freed from the ferments, which they still contain, by racking during the first year in proportion as the lees settle. Finings should be used only in cases when it is impossible to obtain perfect clearing by racking at the proper time.

(4) When the wines have reached, in barrels, their third or fourth year, in case they are not bottled, they should be racked and preserved in *tuns*, and treated in the same way as if they had remained in barrels. These tuns should have been previously used for white wines of the same character.

(5) The wine should be constantly watched, and it should be ascertained by frequent tastings if no fermentation has set in; in the latter case the wine should be immediately racked. If the wine remains quiet after the first violent fermentation is over, it should be racked every year three times, be it an old or a new wine. The first racking is done in March, before the spring equinox; the second at the time of the bloom of the vine in June, before midsummer, and the third and last at the time of the maturing of the grapes in September, before the autumnal equinox.

It is worth while remembering that the less alcohol white wines contain, that is, those which remain mellow after their first violent fermentation, the more liable are they to undergo an after-fermentation and to thus lose their mellow character. If the white wines on hand are sweet

and contain less than 15 per cent of alcohol, it is necessary to fine them completely in order to free them from their ferments. Certain ordinary white wines are difficult to fine. It is possible to obtain perfect clearing only by the simultaneous employment of the racking treatment with sulphurous acid and of gelatine in conjunction with tannin. This tendency to ferment is quite natural for wines which are poor in alcohol; and the mellow wines which contain less than 15 per cent of alcohol are not through with their natural violent fermentation; stopped either by the use of sulphurous acid or by frequent rackings or by other means. This stopped fermentation sets in easily again as soon as the wine is left to itself and as soon as the needful watchfulness is relaxed. A rise in the temperature or the wine being transported produces the same result.

In the wines, on the contrary, which attain the highest alcoholic percentage due to fermentation (between 15 and 16 per cent), no new alcohol is formed at the expense of the sugar, unless the liquid becomes weaker through evaporation. These wines are consequently less liable to undergo fermentation, other conditions being equal. If it is necessary to send to a great distance, or even only to preserve sweetish, mellow, but ordinary wines, whose alcohol-percentage is low, they should be slightly fortified with a very strong and pure alcohol, so as to contain 15 to 20 per cent of this ingredient. This only after having become perfectly bright. It will thus be possible to preserve them under ordinary conditions and to transport them easily; it is not advisable, however, to make use of this extreme means excepting in the case of wines which are sweet but which possess an ordinary flavor.

CHAPTER IV.

BOTTLING.

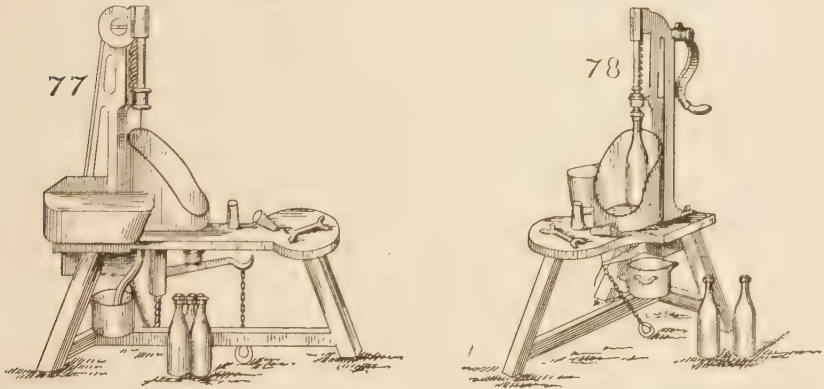
CHOICE OF WINES TO BE BOTTLED.—Only wines which date from a satisfactory vintage, which possess a fruity taste, and which are susceptible of acquiring and developing flavor and bouquet on aging, should be put aside for purposes of bottling and aging. Wines which date from an indifferent vintage, or which were made from an ordinary variety of grapes and which are faulty, thin, tart, rough, etc., should not be bottled and stored in cellars, because they are not susceptible of improving in quality on aging, and because consequently it would mean the loss of the interest on a capital which has been invested in bottles, fixtures, and labor.

The wines which are destined to be bottled should fulfill the following conditions:

1. They should be perfectly bright.
2. Their natural clearing should be completely finished, *i. e.*, they should be entirely free from excess of color, of ferments, and of salts, which they keep in suspension during the first years, and which settle on standing and on treatment with finings.
3. They should also be completely through with the after-fermentations.

Should the wines be bottled without fulfilling these conditions—that is, should they be too young or turbid, two grave inconveniences would be the result.

Should the wine be bottled when it is yet too young, the after-fermentation, the separating out and settling of the lees, would continue in the bottles; the wine would acquire a taste of lees and a disagreeable bitterness, and even the bottles would burst should the fermentation be too strong owing to the generation of carbonic acid gas. Anyhow, voluminous sediments would form in the bottles; they would even necessitate the emptying of the bottles into barrels—slow and expensive operations, which are injurious to the quality of fine wines.



CORKING MACHINES.

77, 78. Machine for corking bottles (system, Gerrais). This machine is a modification of the ancient machine (drawing No. 79). The corking and movement of the needle is done automatically; the hand-lever is replaced by a treadle (foot-board), and a basin is present to receive the liquid produced by breakage.

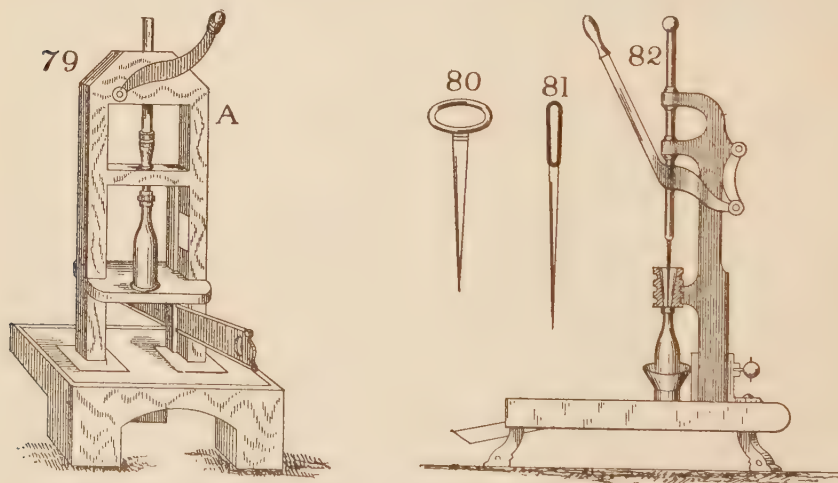
It is not possible to state precisely the age which mellow wines should possess in order to be bottled in good condition. In this respect it is only possible to go on general principles. It depends equally upon the more or less favorable conditions of the vintage as upon the variety of the wine, of the crop, of the stock, of the processes of vinification that were used, of the labor and attention which have been bestowed on the wine, etc. As a rule, the delicate wines which are low in alcohol and deficient in color, or those which date from the years when the grapes did not fully mature, are the most advanced, while the strong, full-bodied wines with a deep color, dating from warm years, are the slowest to deposit the solid matters in the barrel; it is self-evident that such wines keep much longer in bottles, while on the contrary wines which age rapidly in barrels do not last a long time.

The most precocious wines of the Gironde are fit to be bottled towards the end of their second year. The Medoc wines, as a rule, which date from hot years, reach this stage only in their third year. If they remain longer in the barrel, they are apt to lose their mellow taste. Exceptionally, however, certain very full-bodied wines require four years.

If a wine possesses a high alcohol-percentage, together with a rich color and much tannin, a long time is required for it to develop in the barrel. The first crops of Saint Emilion, and particularly the first Queyries, belong to this category. We have seen Queyries of pure *Petit Verdot*, of the year 1851, which, after having been for six years in bar-

rels, were hardly sufficiently mature to be bottled; but this is only an exceptional case, which is due to the stock, for in the same country the wines which are made from *Vidure*, *Malbec*, *Merlot*, etc., are fit to be bottled from the beginning of their third year, and even often towards the end of their second year; but they do not last so long.

The indications that a wine fulfills the necessary conditions in order to be bottled are: that it should be well freed from the lees so that there should be hardly any sediments at the times of the half-yearly rackings; that its color should be brilliant, and that it should have lost the roughness and harshness of the first years, but that it should retain at the same time its mellow taste. It should not be expected that the fine wines will develop their bouquet in the barrel. In olden times the latter method was followed. The wine was allowed to remain in the cask until it almost began to degenerate, and only then was it bottled. The use of this method makes the wine not only lose a part of its velvety, mellow taste, but it has also been proved by experience that wines which have been treated in such a manner do not last so long as those which are bottled *before the bouquet has developed and while they have their fruity taste*. In this case the only drawback is that the possibility exists of obtaining earlier and more voluminous sediments in the bottles unless the greatest precautions have been exercised to bottle the wine only when it has perfectly cleared.



79. Corking machine, ancient model—description of its working see text. A hook is adapted to *a* in order to withdraw the needle from the neck of the bottle.

80. Needle for corking (ancient model) with ring and hinge.

81. Needle specially designed for use in the machine Savinean.

82. Corking machine of Savinean—see description of its working given in the text.

PRELIMINARY PREPARATION OF THE WINE IN BARRELS.—Even if the wine which is destined for bottling appears bright, it should be first racked and fined, as a matter of precaution, in order to precipitate completely all the insoluble matters which may be in suspension.

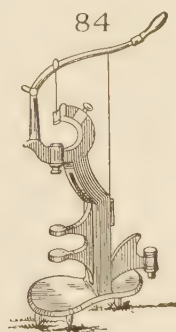
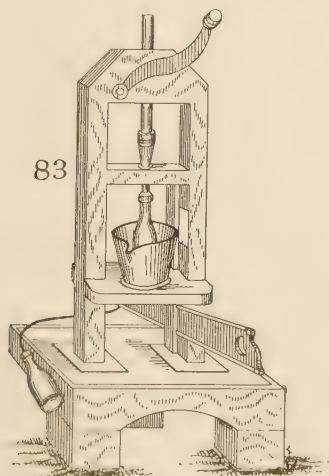
The kind of finings most preferable is albumen; the white of six to eight eggs. As soon as the wine has become perfectly bright during the month which follows the treatment with finings, it should be racked; the

barrel should be also slightly sulphured; the wine is now allowed to remain in the barrel at least three weeks before bottling it. We should avoid bottling wines which contain finings, for the lees, which may have been disturbed by the moving of the barrel, rise frequently to the stopcock and make the liquid turbid.

If, however, the wine which is destined to be bottled is perfectly bright, and if it is very delicate and mellow, it is admissible to dispense with the treatment with finings in order not to diminish the body and to destroy to no purpose the fruity taste. In this case it is sufficient to rack the wine and allow it afterwards to rest.

It should not be forgotten, however, that a bright condition of the wine is essential; if this detail is neglected there is sure to form in the bottles a voluminous sediment. If it is absolutely necessary to bottle wines which are too young, they should be repeatedly fined, in order to avoid a too early formation of sediments. These repeated finings, it is true, bring down the insoluble matters, but they also make the wines harsh, because they precipitate as well the matters which impart the oily and mellow taste.

RINSING THE BOTTLES.—The bottles are washed and rinsed, as a rule, in the glassworks, or in the store-houses, unless they are destined for a long voyage, or unless an agreement to the contrary has been made. These are afterwards placed in draining baskets. These baskets are used for their transportation; for the same purpose pigeon-holes are sometimes used. If wines dating from an extra good vintage have to be bottled, the bottles should be sorted, and those which possess too prominent unevenness in the glass and whose apertures and bottoms are irregular shaped, as well as those which possess any other blemishes, should be put aside. After sorting, the bottles should be thoroughly washed, and drained in the baskets.



83. Corking machine (system of Kehrig). This is the machine used in Bordeaux. It resembles Fig. 79, to which is added a reservoir destined to receive the liquid produced by breakage.

84. Small corking machine. These small machines, of which many patterns exist, are used only in a small way.

This precaution is necessary, for in the glass manufactories great quantities of bottles are rinsed in the same water, and consequently the degree of cleanliness attained is a doubtful one. In order to rinse easily, one should have either two tubs, which may be made from a barrel, or a hogshead, sawed into halves; or two basins in the form of a lozenge, three feet long and two feet high, which are covered inside with tin or zinc, or are made of beton. In winter the water may be easily warmed by means of a stove covered by a hermetically closed boiler, which communicates with the water of the basin. This arrangement is useful only in cases where a great number of bottles have to be rinsed every day. In a cellar of the ordinary size the two tubs are mounted on a stool.

The bottles should be drained in the basket for one or several hours before being filled; but they should not be left in this condition during several days, particularly in moist cellars, for the humidity might possibly develop mold on their inner surface, which would impart to the wine a bad taste. In this case they should be rinsed again before being used.

The bottles, after having been rinsed and drained, are filled, as a rule, without any other preparatory measure. If, however, the wine which is being bottled has a low alcohol-percentage, and not much body, and is deprived of its preserving elements by excessive age, its keeping qualities can be increased by pouring a little old brandy into each bottle before filling.

This brandy is transferred from one bottle to another without allowing them to drain too long. *It would be an excellent method to rinse the bottles with wine of the same character as the one which is destined to be bottled, particularly in the case of the extra fine wines.*

The only drawback to this method, which is a very good one, is that it requires one more workman and the expense of a couple of bottles of wine, which becomes turbid and weak after having been used for rinsing.

THE BOTTLING PROPER.—The bottling is generally performed with the help of a copper faucet of the usual pattern.

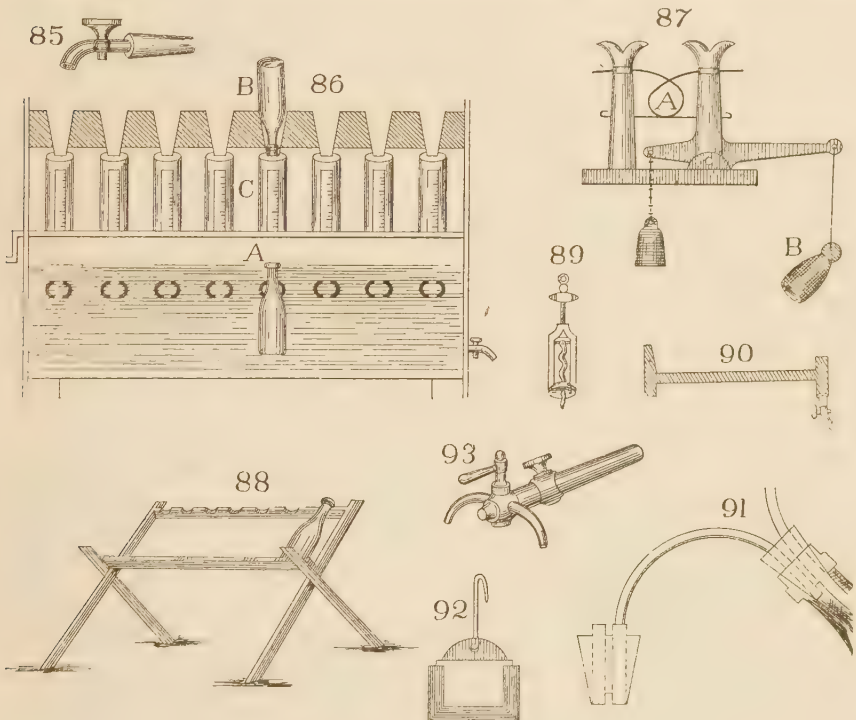
This work could be hastened by using a system of special faucets which allow us to fill several bottles at the same time without losing any wine, and which regulate perfectly the level which the wine should attain in the necks of the bottles. (See Fig. 94.) This system could be very profitably applied to the drawing off of wines and liquors, particularly of those which are in barrels; but in cellars whose space is often very limited it does not offer much advantage in comparison with the simple faucet, *particularly with a skilled workingman*; on account of the delays which are occasioned by the lifting of the barrel, this cannot be effected conveniently with this apparatus.

The barrels whose contents are destined to be bottled should be placed in cellars which are well protected from access of the air. They can be piled up two and even four rows high; the barrels of the lowest row should be placed on benches which are sufficiently high to enable the pan to be easily placed under the barrels.

In order to draw off the wine from the barrels of the lowest row into bottles, a pan for holding the bottles and receiving the drainings is placed under the barrel. After it has been stably placed on blocks of

wood, or on triangular blocks, the faucet is inserted; the socket should be first wrapped in a strip of linen and then driven in by gentle blows; care should be also taken to turn the nose of the faucet towards one side, in order that the wine should not fall perpendicularly in the bottles, and should thus produce as little foam as possible by gliding along the walls of the bottle. By operating in this way the wine is less affected by contact with the air.

The workingman, after having taken out the bung as gently as possible (with a gimlet, if the bung is cut off, never with the bung-starter or mallet, for the violent shock is apt to make the wine turbid, by dis-



BOTTLING.

85. Stopcock used for bottling in Bordeaux.

86. Apparatus employed for decanting bottles (system of M. Vinean, of Bordeaux); *c*, zinc tube with graduated glass-scale; *b*, a bottle which is being decanted, placed on the funnel over a tube; the crank shown in the cut is used for emptying the water from the tubes into the basin; the leather arrangement can be replaced by stopcocks at the bottom of each tube if desired.

87. Machine for putting on capsules (system of Blanchard). This machine, which is a very simple one, is fixed to a table. In *a*, the neck of a bottle with its capsule is introduced; by pressing the footboard at *b*, the strings which surround the neck at *a*, contract. It is but necessary to impart a rotatory movement to the bottle and to push it at the same time forward in order to fix the capsule on the neck.

88. Bottle rack.

89. Corkscrew.

90. Extension tube and cock for filling the bottles from casks which are piled up in the fourth or fifth row.

91. Decanting corks, described in the text.

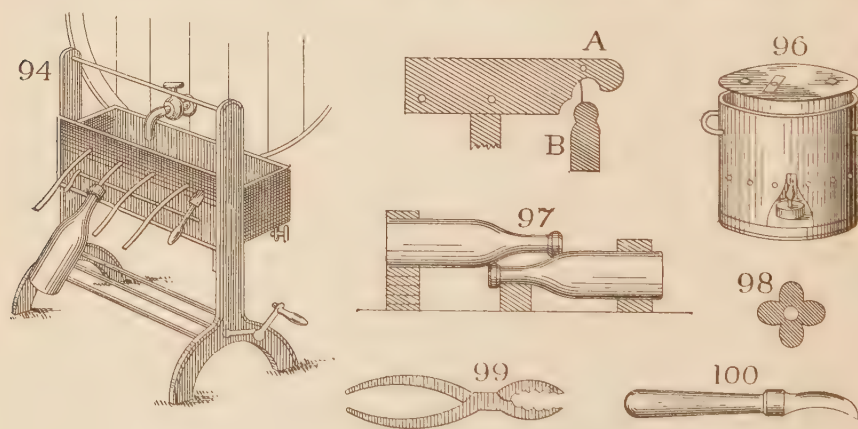
92. Rack into which a card may be placed designating the wine, when racked, etc.

93. Faucet of the pattern used in the Champagne; it has two nozzles and a double stopcock, the advantages of which are plainly apparent.

turbing the lees), sits down on a box or on a stool before the basin; he has within his reach a basket with empty bottles, which is slightly inclined towards the barrel to be drawn off; he lets a small quantity of the wine run into the first bottle in order to clear the faucet of the impurities which it may contain; he then puts this first bottle aside and begins the drawing off by placing separately each bottle under the faucet, which he opens. As soon as a bottle is full, he changes it rapidly without turning off the faucet, and regulates, at the same time, the filling of the bottles to the same level, which should be about one and one fourth inches distant from the aperture of the neck, if the bottles are corked with the "needle" machine, and two to two and one half inches for ordinary corking. In order to avoid the spilling of the wine into the basin, an inexperienced workman should open the faucet but little, and gradually he will acquire such proficiency as to enable him to leave it more and more open without spilling the wine. If the faucet is turned off every time after a bottle has been filled, not only the whole operation of bottling lasts much longer, but there is also imparted to the wine in the barrel an up and down movement which may cause the lees to rise.

In proportion as the bottles are filled, the workingman places them upright in a box which contains fifty pigeon-holes; this box should be within his reach or on the floor, which has been previously leveled and strewn with half an inch or an inch of sawdust or fine sand.

When the faucet ceases to run, the workingman has the barrel lifted by another workingman; this should be done very gently either by the hand, a screwjack, or by wooden wedges (compare the chapter on



BOTTLING.

94. Bottling machine (system, Farrow and Jackson). Described in the text.

95. Machine for putting capsules onto the bottles. This is a board of hard wood which is fixed to a table; it is cut out at *a*, in order to facilitate the introduction of the neck of the bottles. A string is introduced through a small hole in *a*, and fastened by a knot on the outside; the other end is connected with the footboard *b*. In order to adjust the capsule, the string is wound around the neck, the bottle is placed above *a*, and the footboard pressed down; then by turning the bottle and imparting to it a movement forward the capsule is fastened to the neck.

96. Stove for use in branding corks, model of Kepsig.

97. Bordeaux bottles, as shown in the cellar.

98. Trefoil. Instrument used in wiring sparkling wines.

99. Bottle forceps. This instrument is used to open bottles containing sparkling wine.

100. Book knife to assist in the preceding operation.

Description of Utensils). He should take the greatest care to see that the wine in the bottles, which are filled when the barrel is lifted, be always perfectly bright; if he finds that it is a little turbid in some, he should put these bottles aside to decant them when they shall have cleared.

In order to draw off the wine from the barrels which are piled up in the second and third rows, the basin is raised by placing it on empty boxes or barrels, but always in such a manner as to give the bottles an inclined position.

CORKS.

In former times very long and slightly conical corks were used for Bordeaux wines; in those days the corking was done by hand with a mallet. The great length of the corks was almost to no purpose, because on account of their conical form they did not fit perfectly in the neck of the bottle, excepting at the top near the ring; their lower end was scarcely pressed at all by the neck. To-day the practice of corking the bottles by machinery has become universal, and the shape, length, and the thickness of the corks have been modified. For the corking of extra fine wines shorter corks are used than in former times. (These corks are two inches long, are thicker, and have an almost cylindrical shape.) Their average diameter for small bottle necks is 0.8 inch.

These corks, which are forced into the bottles with the help of the piston of the corking machine, exercise on the neck a uniform pressure throughout their whole length; this pressure is also much stronger than that of the corks which are forced in with a mallet.

The conical corks, be they long or short, are used only in the absence of a machine and for corking wines destined for everyday use.

The various qualities of corks are the result of sorting. And, indeed, it is possible to find in the same piece of cork bark, portions which are more or less hard or porous. The cork manufacturers pick out the least porous and the most supple corks. This first picking over is followed by several others. The corks of the first picking are the soundest and the most supple; they form the quality which is styled *extra fine*. Notwithstanding these repeated sortings, rarely a perfect cork is found; that is, one which is free from visible pores.

The ordinary non-assorted corks, and particularly those which have been rejected in sorting, are hard and very porous; they break more bottles than the supple corks, and if they are too porous the dust which they contain in their pores enters the wine, makes it turbid, and may also impart to the same a disagreeable taste. Aside from that, the ordinary corks sometimes allow the liquid to ooze out. For this reason they should not be used in the corking of fine wines, for, in the end, it would be more expensive to use them instead of extra fine corks, owing to the loss of wine, to the breakage, and to the bad taste which they might impart.

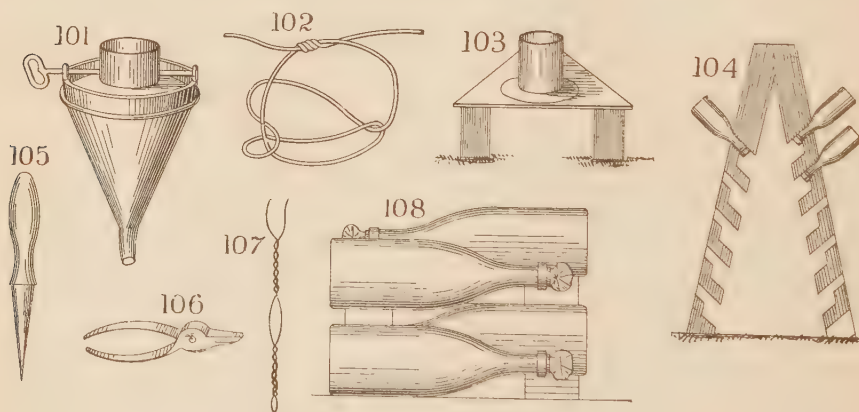
Preliminary Treatment of the Corks.—Before using the corks which are destined for corking by a machine, care should be taken to render them more flexible by soaking for several hours in water of ordinary temperature, or rather by allowing them to remain for two or three hours in boiling water; they are afterwards allowed to drain, and before being used they are again soaked, but this time in the wine which is to be bottled. If it is desired to give to the new corks the appearance and

vinous color of the corks which have been used in corking old wines for several years, they should be soaked in boiling wine for four or five hours. Before using them they should be again soaked in wine.

Whatever the preliminary treatment of the corks may be, either with cold or with hot water, or with wine, their introduction into the neck of the bottles is facilitated by dipping them into brandy before using them. This treatment makes them more slippery.

Steaming the Corks.—Steam penetrates much easier than hot water into the pores of the corks. An apparatus for steaming corks can be rigged up without expense and very easily. The simplest and most convenient arrangement for steaming a small quantity of corks is given in the following:

An ordinary boiler of copper or of any other metal, which should be sufficiently deep, is fitted with a wooden cover; the wine or water is poured in, so as to reach a height of four inches, and above the surface of the liquid a wooden or metallic grate is placed; this grate rests on four legs, and is destined to prevent the immersion of the corks in the liquid, but to allow the steam to circulate freely; the corks are now placed on the grate, and the boiler covered and heated. As soon as the liquid begins to boil, the steam rises and enters the pores of the corks and softens them considerably; they are allowed to remain in the boiler from two to four hours.



101. Funnel according to M. Mosach.
102. Knot fastening in the cork of ordinary and sparkling wines.
103. Case prepared to hold the bottles while wiring corks.
104. Stand for storing bottles neck downwards—useful for sparkling wines.
105. Knife with double edge.
106. Pinchers for cutting and binding wire.
107. Wire twist and loops.
108. Manner in which the bottles are stored in the Champagne District.

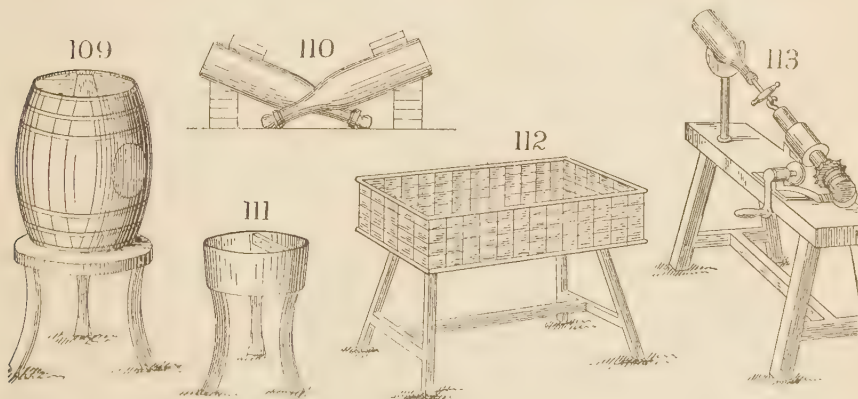
SEALING BOTTLES WITH WAX.

If bottled wines are destined to age in the cellar, or to be placed in pigeon-holes in buildings, which are free from humidity, and if they have not to remain there longer than one or two years, it is possible to dispense with the sealing. Thus an amount of extra labor is saved when they have to be sent off, because it is the rule to send off the bottles capulated; it would be necessary to remove the wax before putting on the

capsule. But when the cellar is very moist, and when very costly wines have to be stored for several years, the sealing wax protects the corks from the influence of the humidity, which would make them rot rapidly; and also from the attacks of insects, which sometimes gives rise to loss by leaks.

To Prepare the Sealing Wax.—In order that the sealing should be effective, it is necessary that the wax or mastic which is used should be very adherent, fat, unctuous, and not brittle. Most of the sealing waxes for bottles which are found in the trade are too dry and too brittle for this purpose. The best sealing wax is made from gallipot (a white, viscid resin). It is prepared by fusing the resin in a saucepan on a slow fire. This fusing should be watched attentively, for it is liable to foam and to rise over the rim of the pan unless it is incessantly stirred and taken from the fire at the right time. When the resin is well fused, the impurities which it contains are removed, such as fragments of cork and chips of pine wood. Then a little tallow is added in order to make it fatter; about three hundred grains of tallow to a pound of resin are used. This sealing wax is used without the addition of coloring matters. Its natural color is russet. It should be kept constantly hot, without, however, heating it to boiling during the operation, which consists in quickly dipping in the necks of the bottles, whose corks should be dry. It is unnecessary to cover much of the neck with the wax. As this operation is performed only to protect the corks, the wax should not go below the ring. Thus labor is saved when the wax has to be taken off in order to put on the capsules for sending them off. In case gallipot cannot be obtained, resin in the form of cakes, or the mastic tablets which are found in commerce, should be used. The cakes or tablets are broken before being put on the fire, and about three hundred grains to an ounce of tallow per pound of the resin are added.

Coloring the Sealing Wax.—If, in making the sealing wax, the tallow is replaced by unbleached wax, a mastic is obtained which is more brill-



109. Disgorging cask. The sediment being discharged into the hole shown in the side of the barrel.

110. Improved stack for bottles.

111. Tub for corks removed from bottles, provided inside with a wire net on which the corks fall and drain.

112. Basket for corks.

113. Apparatus for uncorking and emptying champagne bottles, the working of which is plainly shown in the figure.

iant and finer than that into whose composition tallow or stearine has entered. Various colors may be imparted to the wax according to necessity—red, yellow, black, blue, green, etc.; since the use of the capsules has become general colored wax is seldom used for sealing the bottles which have to be transported. The quantity of the colors used is on the average one ounce to every two pounds of sealing wax; the color is put in the hot wax, which, however, should not boil, and it is mixed in gradually, stirring the whole with a spoon of galvanized iron or with a wooden spatula. Wax is colored red (the color, by the way, which is most frequently used in commerce) with *cinnabar*; deep red is obtained by means of *red ochre*; the yellow with *orpiment* (sulphide of arsenic); deep yellow with *yellow ochre*; black with *animal charcoal*; blue with *Prussian blue*; green is produced by a mixture of equal proportions of the blue and yellow colors. The poisonous colors, such as cinnabar and orpiment, can be replaced by the ochres, which are perfectly harmless; their color, however, is never so brilliant.

TREATMENT OF THE BOTTLED WINES.

The bottled wines are liable to undergo various alterations. These are: 1. The acquiring of the "working" taste; 2. Voluminous deposits and loss of transparency; 3. Bitterness; 4. Roughness; 5. Sliminess; 6. Decomposition and putrefaction. Most of these defects can be ascribed to the fact that the condition of the wine which was bottled was bad, or, in other words, that the wine was too young; its after-fermentation was not over, and it was not perfectly bright. These defects are also caused by extreme variations of temperature, or, lastly, by too great age.

Taste of "Working."—The taste of "working" is due to the presence of carbonic acid in the wine. This acid is produced by an untimely fermentation which starts in wines still containing mucilaginous substances, ferments, and saccharine matters. The after-fermentation of wines which contain such matters is consequently not over, and is completed in the bottles. The same influences which start the fermentations of wine in wood, such as contact with the air, the rising of the temperature, etc., act on the bottled wine.

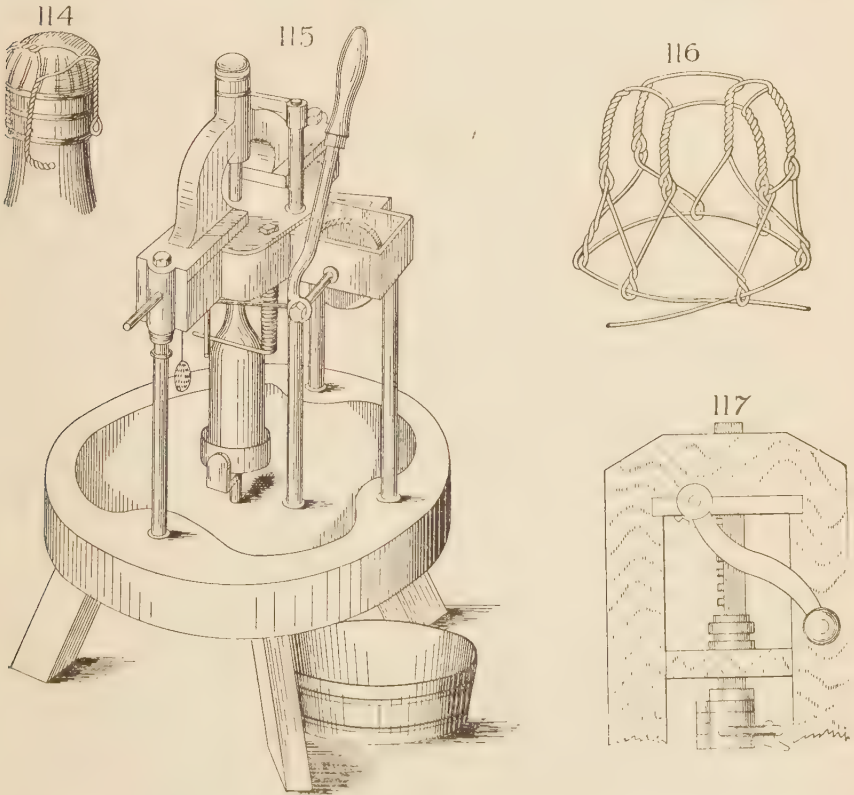
These alterations can be prevented by avoiding the bottling of wines which are too young, or not perfectly bright, and when they are bottled by protecting them absolutely from the access of the air, by corking the bottles hermetically, and by storing them in places which have a constant temperature.

The sweet and simply mellow wines which contain saccharine matters, whatever their nature may be, are liable to ferment in the bottle, particularly if they are submitted to a high temperature, and if their alcohol-percentage does not exceed 15 per cent.

The non-sparkling wines which ferment in bottles should be transferred back to the barrels, and afterwards treated in a special manner (compare *Treatment of Faulty Wines*). The fermentation may be partly stopped by placing the bottles upright in a cool place, and leaving them in this position for at least two days; afterwards, they are opened for an hour or so in order to give an outlet to the carbonic acid gas; but this operation is but palliative, and does not correct the evil. In the majority of cases these wines are turbid, and then it is advisable to put them back into wood.

Voluminous Deposits—Loss of Brilliancy.—After having remained for some time bottled, the wines form more or less sediment according to their quality, to their age, and to the brightness of their condition, possessed at the moment of their bottling. The character of the sediment varies also according to the variety and age of the wine. These sediments or lees consist mostly of coloring matters and organic and mineral salts, which, after having become insoluble, are precipitated by their own weight to the bottom of the liquid.

Sometimes the sediment adheres to the walls of the bottle. In certain wines it has a muddy consistency and does not adhere to the glass. Sometimes, also, the sediment appears like gravel, particularly if the wine contains a great deal of tartar (bitartrate of potash). Several things hasten and promote the formation of sediments. Sediments often reach a considerable volume after a few years in wines which were bottled too young, or in those which were blended with wines of a different character. In wines dating from good years which have not been



114. Champagne bottle corked with the machine of Maurice, and the clasp specially used with this machine to replace tying by the ordinary method.

115. Machine for corking sparkling wines, by the Maurice system.

116. Cowl for tying in the corks of bottles with sparkling wine, according to Adrien de Mestre, of Bordeaux. This system is used for corking champagne bottles.

117. Bordeaux machine with jointed tube—system of Mestre—for corking sparkling wines.

blended with other wines, made from a good variety of grapes, carefully treated, and bottled under normal conditions, a sediment is hardly deposited after two or three years from the date of the bottling. Frequent moving of the bottles, however, long voyages (particularly if the corking had not been done by means of the bottling machine), variations of temperature, and the decomposition of the wines which have become too old, increases the sediments by precipitating a portion of the color and of the salts in solution.

If the sediment is voluminous, it is apt, in the long run, to impart to the wine a bitter and harsh taste or the taste of the lees. It is therefore very important to separate this sediment from the liquid, particularly in the case of fine wines. This can be done by decantation. If there is not much of a sediment, and if the wine is of a high quality and has not acquired any bad taste, it should be avoided, for this operation causes the wine to lose some of its bouquet—particularly if done without the necessary precautions.

These observations apply to bottled wines which have deposited some sediment, but which nevertheless preserve their limpidness, the brilliancy of their color, and brightness. As for wines which become and remain turbid in the bottles, it is absolutely necessary to fine them; and as it would take too much time to perform this operation in the bottles, the wine has to be transferred back to the barrel.

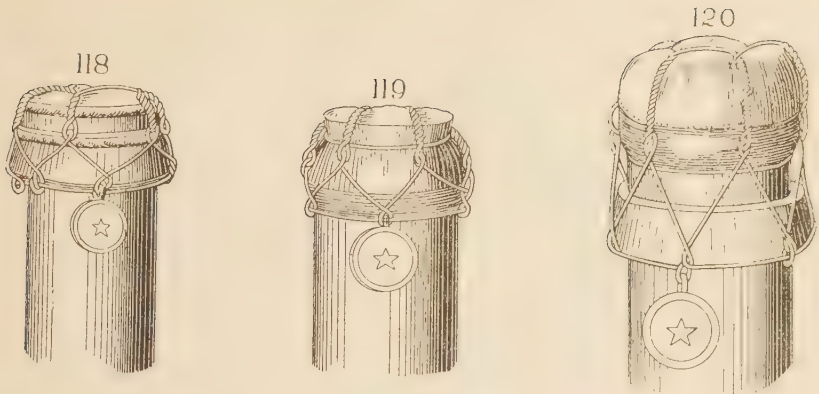
Bitterness—Roughness.—The most usual cause of these defects in bottled wines, if not due to the sediment, is the loss of their fruity and mellow taste; it is then a sign of a beginning decomposition. It is rarely that this defect does not increase with time. The only remedy, if the wine so affected is of high quality and has not lost its bouquet, is to blend it with younger wines which are mellow and perfectly clear.

Sliminess.—Sliminess is an alteration which develops in wines containing but little tannin. This defect occurs chiefly in white wines which have been bottled when not perfectly clear, and which contain nitrogenous matters in suspension. The slime in the bottled wines can be destroyed by the same means which we have indicated for wines in wood (compare *Treatment of Faulty Wines*). If the wine has lost much of its quality it is necessary to put it again into barrels and blend it with wines of the same character, but which are younger.

DECOMPOSITION—PUTREFACTION OF WINES.

Wines in bottles keep and improve in quality if they are suitably treated, that is, so long as their component parts remain united and soluble, but after a lapse of time, which varies according to their special character, they begin to lose in quality. This decomposition is indicated by many signs, appearing sometimes in advance, particularly in the case of wines of high quality. These signs are: loss of the oily and fruity taste, further bitterness, and sometimes roughness. After the lapse of several years, it may be observed that the bouquet loses its sweetness, and that the wine acquires a "*rancio*" taste, which covers its natural flavor. The wine also loses its color rapidly, and deposits a sediment which is much more bulky than that which is formed during the first years after bottling. Lastly, when the decomposition is rather advanced, the wine acquires a slightly putrid odor.

On the average the fine wines of the Gironde, which date from a good



118. Method of corking according to Mestre, applied to Bordeaux bottles.

119. The Mestre system applied to alcoholic liquids.

120. Champagne bottle provided with the clasp 116, and the capsule of Mestre.

year, improve in quality after the first two years after bottling; the wines which are deficient in body and are delicate, begin to deteriorate even before this length of time; the full-bodied wines, which take naturally a longer time to develop their qualities, keep a much longer time; there have been examples of such wines which have preserved their qualities in bottle as long as ten years; but as a rule, after having remained three years in the wood and the same length of time in bottles, they have attained the maximum quality they are able to acquire.

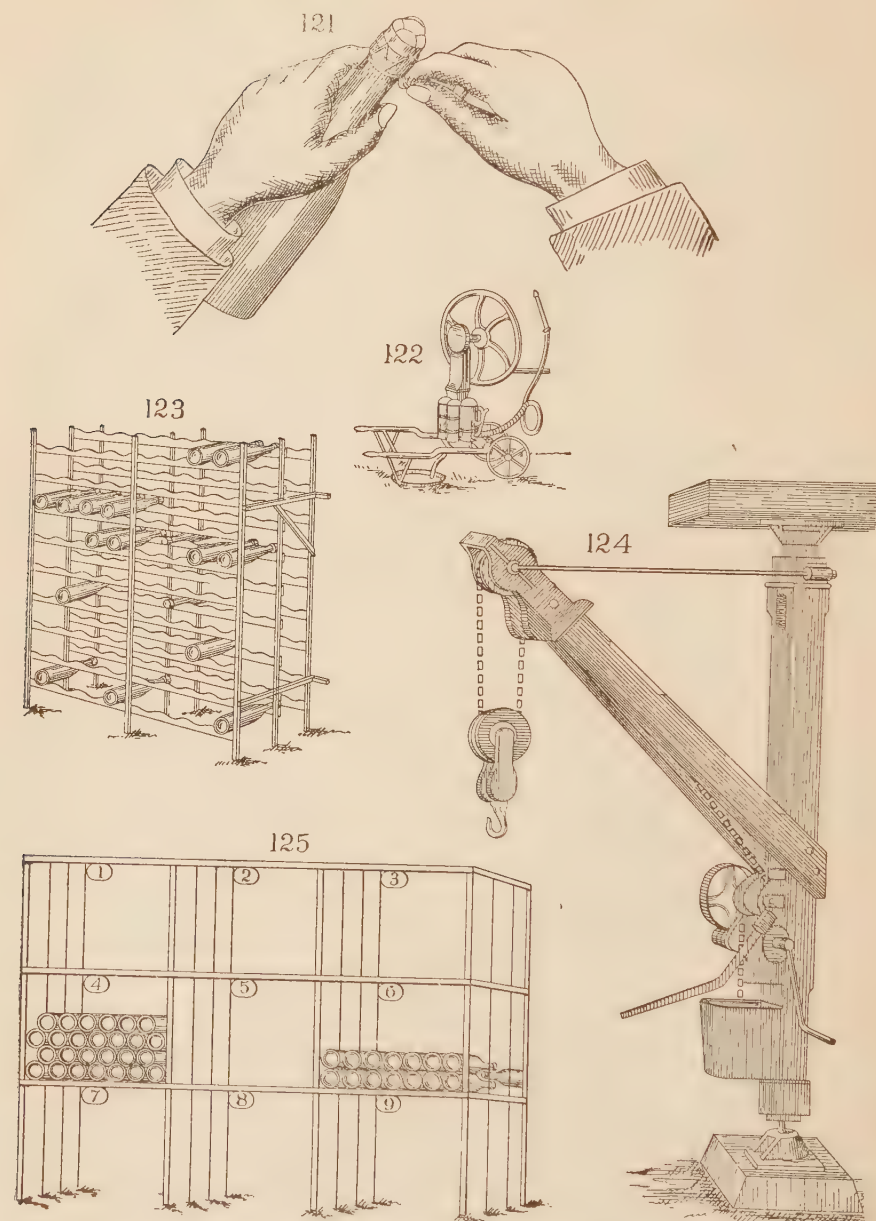
As soon as it can be noticed by the taste that a high-priced wine has attained its full development in the bottle, it should be cautiously decanted into bottles which have been rinsed with the same wine, and these bottles should be closed with *ground* glass stoppers.

Certain wines, such as those made from the first crop of *Petit Verdot des Queyries*, the first quality Saint Emilion, first quality Barsac, and Sauterne, keep a much longer time. The loss of color, together with the abundance of sediment, which is a constant sign of deterioration in the wines of the Gironde, should not be interpreted in the same sense for all kinds of wines.

Thus, the red wines of Spain or the sweet wines of Roussillon, which possess a very deep color as long as they are young, lose their color, almost entirely, after having been bottled three or four years; they assume a golden yellow color, without, however, deteriorating; but in these wines, whose alcohol-percentage exceeds fifteen, it has been observed that the sediment is not so considerable in proportion to the color which has been precipitated as in French wines, and that the coloring matter remains sticking in all directions to the inner sides of the bottles instead of sinking to the bottom.

The alcohol and tannin are the preserving principles of the wine; it follows from this that the more abundantly a wine is provided with these substances the longer it will keep.

The origin of the deterioration of wines is the dissolution of their component elements, which become thus insoluble and are precipitated. The loss of tannin, which is transformed in time into gallic acid, removes from the weak wines their most effective conserving element, and causes



121. Uncorking of bottles which have been corked according to the Mestre method.
122. Portable pump for transferring wine from one cask to another. System, A. Suc.
123. Pigeon-hole bottle rack of corrugated iron, each pigeon-hole receiving one bottle. These pigeon-holes offer the advantage of enabling one to take out one or more bottles without moving the rest. They, however, occupy much more room than the racks shown in Fig. 125.
124. Turning crane. System, A. Suc.
125. Spaced rack. These contain three hundred and twenty-five bottles, or a barrel of wine each. The bottles are stored away with the help of boards, which are placed between the layers; they are of the same length as the spaces partitioned off.

a precipitation of the coloring matter. In support of our assertions it has been observed in practical work that wines which contain tannin in large quantities have the advantage of keeping much longer than wines which have the same alcohol-percentage, but which are poor in tannin.

We have, therefore, good reason to believe that the transformation and loss of the tannin is one of the chief reasons why wines degenerate. What science has not explained up to this day, is the cause of putrefaction in the last period of the degeneration of bottled wines—wines which are too old or poor in alcohol; the cause of the transformation and decomposition of their alcohol without any contact with the air. True, it is a known fact that putrefaction starts in only in wines which are very poor in alcohol (below 8 per cent), and which have remained a long time in the bottles, and after the coloring matter and the salts which are contained in the wine have already begun to separate out; but what has not yet been explained is, as we have already said, the cause of the decomposition of the alcohol.

CONCLUDING REMARKS—GENERAL PRECAUTIONS.

In order to prevent the defects which bottled wines may acquire, the following precautions should be taken:

(1) Only those wines should be bottled whose after-fermentation and clearing have been completed.

(2) The moving of the bottled wines should be avoided as much as possible. They should also be protected from changes of temperature by storing them in specially constructed cellars.

(3) They should be freed from their sediments at the proper time by decantation, but this means should not be adopted unless the sediment is voluminous, or unless it has imparted to the wine a bad taste, as by this operation it loses unnecessarily a part of the bouquet and strength.

Decantation.—Decantation is an operation which has for its object the separation of the clear portion of the bottled wines from their sediments. In order to perform this work in the right manner, certain precautions should be used; contact with the air should be particularly avoided. Experience has shown that wines which are decanted when the air has access to them (we speak here of fine wines), have less bouquet, and are weaker in alcohol, than wines of the same character which have not undergone this operation.

The bottles should be taken out from the pigeon-holes without either changing their position or shaking them, in order not to disturb the sediment. To perform this operation easily, they are placed in a slightly inclined position in special baskets, which hold five to six bottles, so that we may uncork them without spilling the wine. These baskets have a partly open bottom, so that they may be placed on a frame or trestle; then with the help of a candle, which is placed below, the movement of the sediment may be followed. We are going later to describe these baskets more in *detail*. If such baskets cannot be procured, the bottles are moved just as they were laid down onto a rack.

After allowing them to rest a longer or shorter time, according to the consistency of the sediment, they are uncorked without shaking, by means of an *English* corkscrew, and the wine decanted slowly into clean bottles which have been previously rinsed with decanted wine. The bottles which have been emptied can be used again after having been rinsed with

plenty of water, and after draining and rinsing them with wine which is similar to that decanted. If it is a wine which shows signs of beginning decomposition the bottles should be rinsed with old brandy. Decanting can be done by hand in the following manner: On the empty bottle a small funnel with a trellis is placed in order to avoid the introduction of impure matters; the bottle is then slightly inclined after having first wiped the orifice, and with the help of a lighted candle, which is held below, the movement of the sediment is followed. When the clear portion of the wine has run off, the bottle is filled completely with wine which has been already decanted, and immediately corked. The decanting should be done in the cellar, and never in work-rooms through which the air circulates freely.

CHAPTER V.

RATIONAL TREATMENT OF FAULTY WINES.

Faulty wines; general considerations. Natural defects. Earthy tastes; means of preventing this defect. Tartness; how to prevent and destroy the same. Harshness; its nature and causes; how to prevent an excess of harshness, bitterness, and the taste of stems. Acidity; hot taste; means of preventing acetic fermentation. Insufficient alcoholic strength. Lack of color; dull, leady, bluish color; taste of lees. Putrid decomposition. Faults or diseases of wines which have been contracted after the fermentation is over. Acidity; pricked wines; roughness; means of preventing acidity; treatment of pricked wines. Taste of the cask; moldy taste; bad taste produced by foreign matters; slime; bitterness; roughness; taste of "working" of the lees, etc. Degeneration; putrid fermentation of wines.

FAULTY WINES.

By this name are designated wines which possess some natural or acquired defect, or which show the beginning of an alteration. From the commercial point of view, by *defect* or *fault* are understood the changes which a wine has undergone after its fermentation, and which are mostly due either to the non-observance of necessary precautions concerning its preservation, or to the poor state of the casks.

The natural defects are not considered in the trade to be real defects.

We divide the different kinds of defects and diseases into two classes:

1. Defects which are due to the nature of the soil, to the fertilizers which were used, to a deficient maturity of the grapes, to unsuitable processes of vinification, to the prevalence of ordinary varieties. It is evident that the defects which belong to this class must be innate to the wines at the time of their leaving the fermenting vat; these defects are the following: Earthy taste, acidity, harshness, bitterness, taste of the stems, hot taste, low alcohol-percentage, lack of color, dull, leady, bluish color, taste of the lees, and tendency to putrid fermentation.

2. The defects contracted by the wine after its fermentation, the majority of which are due to carelessness, or to the bad condition of the casks, are: flatness, moldiness, acidity (pricked wine), taste of the cask, bad taste produced by accidental introduction of foreign soluble substances, slimy condition, bitterness, harshness, taste due to the "working" of the wine, decomposition, and putrid fermentation.

GENERAL CONSIDERATIONS.

Before indicating the means which should be applied in correcting, destroying, or diminishing the defects of wines, I would say, that a faulty wine, whatever its defect may be, particularly if a bad taste is very prominent, will never be equal to a wine of the same kind which was sound from the beginning, even after complete elimination of the defect. It is, therefore, more prudent and wise to prevent the diseases of wine than to wait until the wine becomes faulty and then attempt to cure the defect. It is to the interest of the wine maker to use all the means which are in his power to remedy the natural defects of the wines which he produces.

As far as the wine merchants and consumers are concerned, they should refuse to buy faulty wines, particularly if they make a purchase without having immediate use for it; not only because these wines, notwithstanding their low price, cost more than they are really worth, but also because they lose in quality on aging instead of improving. Thus, by keeping them in the cellar one is exposed to the danger of losing, not only the interest, but also a part of the capital which he has invested in their purchase. Besides, if a wine has a too prominent defect it is only seldom that it is possible to use it alone; either because it is too poor in alcohol and in color, or because it is no longer possible to entirely eradicate the defect. Besides, it would be an error to believe it possible to hide the bad taste by distributing the faulty wine through a large number of barrels of sound wine. The way to do is to destroy or to diminish, first, the defect, by treating each cask separately by a suitable method, and then by blending the wine with the most ordinary brands which are at hand.

In speaking of each kind of defect in particular, we are going to describe its nature, its origin, and the means which should be employed to prevent, diminish, or destroy it. Everybody can ascertain the action of the remedies which we propose by experimenting on a small scale, say with a quart or a fraction of a quart of the faulty wine; the sample should then be well corked and kept in a cool place for at least two days in ordinary cases, and for eight days if it has been previously treated with finings. The quantities of the different correctives which we advise are for one barrel containing fifty gallons. As the quantities which have to be used on fractions of a quart are very small, they can be weighed out accurately only with the aid of a small laboratory balance.

NATURAL DEFECTS.

EARTHY TASTE.—This natural defect is a bad taste which the pulp and the skins of the grapes acquire before fermentation; it is met with in wines which are made from grapes grown on moist, swampy soils, and particularly if such soils have been fertilized too strongly, or if substances have been used as fertilizers which are liable to impart their character to the sap.

PROPER MEANS FOR PREVENTING THE EARTHY TASTE.—The crops from young vines which are growing in moist soils have a stronger earthy taste than those of old vines which grow in the same soil, and this taste is generally more prominent in prolific and ordinary varieties than in nobler varieties. Sometimes it is possible to destroy or diminish this

defect by proper drainage; by allotting more space to the vines; by artificially cleansing the soil, and by avoiding the planting of trees in the neighborhood. If it has been found that this taste is due to a too abundant use of manures, a smaller quantity of these substances should be used, and less wood should be left on the vine. Lastly, a great deal of attention should be paid to the drawing off of the young wine. The murk should be drawn off as soon as the fermentation has gone through, for a long contact of the liquid with the stems and skins only increases the bad taste.

HOW TO DESTROY OR DIMINISH THE EARTHY TASTE.—The treatment of wines with earthy taste differs according to their prominence, their character, and their possible future; but the condition necessary for all of them is that the insoluble substances should separate out rapidly, and that the wine should never be allowed to remain long in contact with the lees. These wines should be drawn off as soon as they have become clear, and they should be also frequently racked to avoid the formation of voluminous deposits.

The red wines which, notwithstanding this defect, promise to develop good qualities in the future, should be racked the first time in the beginning of the winter, again in the first days of March, and should be then fined (after this second racking) with the white of about eight eggs; they should be racked again after a contact of a fortnight with the finings.

If we have ordinary red wines possessing this defect, which are of little promise, whose color is dull and deficient in depth, and which are lacking also in alcohol, they should be treated in the same manner; but before adding the white of eggs, they should be fortified with alcohol of 60–90 degrees, in proportion of one quart per barrel, in order to facilitate the coagulation of the albumen.

If the wines made from marshy, low lands are strong and rich in body and color, and have to be treated for the same defect, an excellent result will be obtained by an energetic fining with two ounces (about two tablets) of gelatine per barrel.

White wines with an earthy taste should, before being racked, be entirely through with their fermentation, and should also have received an addition of seven tenths of an ounce of alcoholic tannin solution per barrel, or an equivalent of white wine which has been treated with tannin. After the first racking, they should be treated with two ounces of gelatine. This racking and fining precipitates the insoluble matters and a portion of the coloring matter, which is strongly contaminated with the earthy taste. Thus this taste is sensibly decreased. If the earthy taste is not very strong, it disappears gradually after each racking. Should the earthy taste be very strong, it is advisable to beat the wine with one pint of olive oil per barrel. After having stirred the mixture well, the barrel should be filled up completely and the oil removed; the latter, by its contact with the wine, takes up a portion of the essential oil which is the cause of the bad taste. After this treatment the wine should be fined in the same way as has been described above.

TARTNESS, ITS NATURE AND ORIGIN.—The tartness of wines is due to the presence of an excess of tartaric acid. This acid imparts to the wines a sourish, harsh taste. The wines which are affected with this

defect contain also another organic acid, but in smaller quantities—malic acid. In tasting such a wine these acids produce in the palate a disagreeable sensation, and like unripe fruits they set the teeth on edge.

The origin of this tartness is to be found in the imperfect maturity of the grapes. It is well known that tartaric acid abounds in most unripe fruits and that it disappears only at the period of maturity, when it becomes transformed into glucose (fruit sugar) under the influences of solar heat.

Thus, a tart wine is an imperfect wine which, besides this defect, has generally some other defects; such a wine is often poor in alcohol and body, and defective in flavor, bouquet, and color. This is because the grapes, which are not completely ripe, contain much tartaric and malic acids, little fruit sugar and mucilaginous substances, and because the substances which are destined to color the skins, as well as the aromatic compounds, have not been completely formed.

MEANS OF PREVENTING TARTNESS.—We refer the reader to the article on “Vintages in Cold and Rainy Years,” in which we have indicated the different means which should be used to counteract the inclemencies of the seasons. Then we have detailed how to avoid the making of tart wines, *without using sugar or other substances foreign to the grapes, and without using alkaline materials to neutralize the tartaric acid in the must.*

The artificial means of improving the must are indicated in the article on *artificial wines*, in which we have made the reader acquainted with their various uses and inconveniences (compare the first volume of this work, *Vinification*).

HOW TO DIMINISH OR DESTROY TARTNESS.—The treatment of tart wines differs according to the quantity of tartaric acid it contains. If the tartness is not unbearable, the wine can be improved by adding one or two quarts of old brandy to each barrel.

The wine contains more tartaric acid after leaving the fermenting vat than after the second slow fermentation in the barrel is through; this can be explained by the fact that the free tartaric acid combines with the tartrate of potash which is contained in the wine, and forms with the latter a new salt, the bitartrate of potash (cream of tartar), which settles down with the lees or adheres to the walls of the cask. The result is that the wine is less tart after the first racking than when it is new; but if the tartness of the wine has attained a very high degree, it will be retained even when the after-fermentation is over. This acid can be neutralized by adding to the wine a convenient quantity of tartrate of potash. This salt will combine with a part of the tartaric acid, and form cream of tartar (bitartrate of potash), and after a few days of rest the wine will be less tart. The quantity which should be used is half a pound to a pound per barrel. In order to apply it, some gallons of the wine are drawn off, and the tartrate of potash, a handful at a time, is thrown into the barrel; the whole should be well stirred, exactly in the same manner as when the wine is fined.

This process is not a new one. It was proposed in 1826 by M. A. Julien, who saw it in use in the neighborhood of Paris. In cold and rainy years certain wines are so tart that it becomes impossible to destroy their tartness by blending them with well matured wines; for if a wine is too tart, and if in order to improve it it is blended with well matured

wines, it appears indeed as if the acid had been partially destroyed as soon as the blending has been done; but after a few days the superabundance of the tartaric acid ends by attacking the good wines, which have been thus sacrificed to improve the poor ones.

It is, therefore, more advisable to neutralize the acid by tartrate of potash. It should be added, however, that the practical application of this method has not yielded such good results as one would expect considering the theory only. I have often experimented on very tart wines and have used as much as thirty to forty-five grains of tartrate per quart, but did not succeed in diminishing their extreme acidity appreciably. We insist, therefore, that the wine maker should do his utmost to prevent this defect. As far as the wine dealer is concerned, he should avoid buying wines which are too tart and which have no future.

The tartaric acid could be also neutralized by alkaline substances, such as the bicarbonates of lime, soda, or potash. By following this method it would be easier to discover the excess of acid, than in any other way; but by neutralizing the acid soluble salts are formed, which remain in the wine, and which may have a bad influence on its hygienic properties. We won't speak, therefore, of this kind of treatment.

HARSHNESS.

ITS NATURE AND CAUSES.—The harsh taste is due to the astringent nature of the tannin. If an excess of the latter is contained in the wine, it imparts a harsh taste to it. Tannin is useful in preserving and fining wines; wines which contain much tannin keep longer without degenerating, and endure transportation better than those which have none, provided their alcohol-percentage is the same. From medical science we learn that wine which contains tannin is more wholesome than wine which does not contain any, for tannin strengthens and tones up the digestive organs. That portion of the grapes which contain most tannin are the seeds, the skins, and the stems. Harshness is not a defect; it is rather an excess of good quality, particularly if such wines have no after-taste of stems, no earthy taste, no bitterness, nor acidity; if their alcoholic strength is considerable, if they have a good fruity taste, and good color; such are, for instance, the first wines of Palus, Queyries, Bassens, etc., which are made from the grapes of pure Verdoot. These wines are harsh on account of the excess of tannin, but valuable in aging, preserving, and blending wines which are deficient in body and too weak to keep a long time without degenerating. Wines which contain much tannin keep a long time; they are, however, afflicted with the drawback of developing very slowly. The harshness decreases with time, because the tannin is gradually transformed into gallic acid. The continuous motion during a long voyage hastens this transformation. Aside from that, the tannin is precipitated by several substances which are contained in the wine, and by certain finings; thus, by its separating out of the wine, the tannin hastens its clearing.

MEANS OF PREVENTING AN EXCESS OF HARSHNESS.—We should never attempt to destroy the harshness of wines which are mellow, weak, and low in alcohol, because, if once the tannin is removed from them, not only their keeping qualities would diminish, but they would also

require a much longer time to clear; in the end they would also have less color. An excess of harshness is prevented in strong and richly colored wines by stemming the grapes which are used, and by drawing the wine from the pomace at a suitable time; if the young wine is allowed to remain too long a time on the pomace, its harshness is liable to increase.

HOW TO DESTROY THE HARSHNESS.—As soon as the wine is in the barrels, its harshness begins to increase, owing to the tannin which is contained in the oak wood of the staves (if the barrels are new); but when the after-fermentation is over, and when the first and most voluminous portion of the lees has subsided, it becomes less harsh, because a portion of the tannin has been precipitated by the vegetable albumen, and by other substances which are contained in new wines. If the quantity of tannin is great, the harshness continues for several years.

If the wines are full-bodied and possess a fine color, their excessive harshness can be destroyed by *precipitating a part of the tannin*; for this purpose it is sufficient to add a good dose of gelatine (two ounces, or approximately two tablets).

It should not be forgotten that when tannin is precipitated, at the same time a portion of the color is also destroyed; this method should be therefore avoided in dealing with pale red wines, and should be only applied to wines which are rich in color and very harsh, and which would require too long a time to develop in the natural way.

BITTERNESS AND TASTE OF STEMS.

Bitterness is a disagreeable taste, which is produced in the new wines by the solution of a bitter substance which is contained in the grape bunches. This substance has nothing whatever to do with tannin. Sometimes this bitterness is due to the cortical portion of the seeds of certain varieties of grapes.

This bitterness decreases in the wine in the proportion as the settling of the lees progresses. The bitterness is prevented by allowing the grapes to mature completely, and particularly by stemming them with care, and not letting them remain too long in the fermenting vat. In order to overcome bitterness the wine must undergo the same treatment as in the case when it is desirable to destroy the earthy taste; afterwards, to each barrel one quart of old brandy should be added.

We now speak only of the bitterness of new wines. The bitterness of old wines is due to an entirely different cause, and requires other measures. We are going to speak of it later.

THE TASTE OF STEMS, which is often associated with bitterness, is due to a prolonged immersion of the grape bunches in the murk. It is presumed that this defect is due to an aromatic substance in the stems. It can be prevented by stemming the berries. Like the natural bitterness, it decreases with time. The remaining of the murk on the pomace in the fermenting tanks beyond a reasonable length of time is one of the chief reasons for the taste of stems and bitterness.

ACIDITY—HOT TASTE.—This defect is due to the presence of acetic acid in the wine. Every wine, even the most mellow, the best made,

and the best cared for, contains acetic acid, but in such small quantities that it is not appreciable to the taste.

The acetic acid is formed in the wines during and after vinification in open vats. Its formation is owing to the contact of the air with the cap. The cap is formed by the ascension of a portion of the skins and stems, which the bubbles of carbonic acid carry to the surface of the must. The alcoholic fermentation ceases very soon in this cap when it has once come in contact with the air, and the alcohol soon becomes transformed into acetic acid by means of certain ferments. This change proceeds so rapidly that in cases when the must is allowed to remain in the fermenting vat too long a time, and the temperature is high, the acid condition of the cap passes into putrid.

So long as the first violent fermentation is going on, carbonic acid is evolved; the bubbles of the latter raise the cap to the surface of the must; but as soon as the heat of fermentation has subsided, the cap sinks down into the wine and imparts to it the acidity which it had acquired from contact with the air.

MEANS OF PREVENTING ACETIC FERMENTATION.—Acetic fermentation can be prevented by various means:

1. By fermenting the must in covered tanks, so as to prevent the access of the air and to compress the carbonic acid; also, by avoiding the formation of the cap by means of a frame.

2. Should the fermentation be conducted in open tanks, it will be advisable to have them only three quarters full, so that a layer of carbonic acid, which is heavier than air, protects the cap from all contact with the air; the cap is also sometimes covered with a layer of straw as soon as it begins to form.

3. By watching the contents of the fermenting tanks, and by pressing the murk as soon as the fermentation has ceased.

TREATMENT OF WINES WHICH HAVE BECOME PRICKED DURING FERMENTATION.—It should not be expected that such wines may improve with time. It is possible to make them palatable, but still their future is lost. This is the reason why it is the direct interest of the producer to prevent this defect by all possible means.

These wines should be racked off as soon as possible from the first lees; that is, as soon as the generation of carbonic acid has ceased. If they are still turbid, their clarification should be hastened by an energetic treatment with finings, and they should be left in contact with the finings only the necessary space of time. Then they should be racked. The object of this preparatory treatment is to free them from a portion of the acetous ferment which they contain.

INSUFFICIENT ALCOHOLIC STRENGTH.—This defect is due to the watery nature of certain kinds of grapes, and to the small amount of sugar which they contain. It is peculiar to wines which are made from grapes which come from young vines, for it is an established fact that young vines which grow in fertile soils, or long pruned ordinary varieties, produce an abundance of watery grapes with large seeds. When the wines whose alcohol-percentage is low are not well supplied with tannin and coloring matter, they degenerate quickly. This may happen even in their first year, before the lees have time to settle completely.

The deficiency in alcohol is prevented by planting in rich soils varieties only which are well supplied with sugar and tannin, such as the two varieties of Verdot, and the two Vidures. These produce full-bodied, strong wines, which possess good keeping qualities, and improve regularly with time.

The treatment of weak wines consists chiefly in freeing them as quickly as possible from the ferments which they contain, in order to prevent further acetic and putrid fermentation, which they are extremely liable to undergo. This result can be obtained by racking as soon as the lees have settled. If the wine should still remain turbid after the second racking, it should be treated with the white of six eggs per barrel. The coagulation of the albumen may be facilitated by adding to the wine, before the fining, from a pint to three quarts of alcohol (90 degrees) per barrel, and to the white of eggs add a handful of common salt in a glass of water. As such wines are not of much promise for the future, it is necessary to blend them with strong wines which are rich in body and color. The practice of fortifying with alcohol is not advisable in this respect. It is true the spirits which are added increase the alcoholic strength of the wines, but they remain dry and without a fruity taste; whereas, if blended with strong and fruity tasting wines of the same character, they acquire alcohol and a mellow taste at the same time.

LACK OF COLOR.

The color of the grapes in most instances arises from the skins of the berries. These colors are yellow and blue in the red grapes, and merely yellow in white grapes.

The natural color of the skins of the red grapes is, as we have said before, a mixture of yellow and blue. The acids have the property of changing the blue vegetable colors into red, such as litmus, orchilla, etc. The blue color of the grapes undergoes materially this chemical change by contact with the organic acids in the pulp, which dissolve in the must during fermentation (tartaric, malic, and acetic acids).

The pulp of most red grapes is colorless. If the red grapes are pressed, and the must is allowed to ferment without the skins, white wine is obtained. This is proof that the color is ordinarily seated in the skins.

The coloring matter is formed in the berries only when they are perfectly ripe. This explains why tart wines, which date from vintages when the grapes had not attained perfect maturity, have so little color. Overripeness has the disadvantage that it makes the skins rot, and thus diminishes the color.

The mode of fermentation also influences, more or less, the depth of the color. Thus, the wines which have been fermented in a manner such that the cap is always kept submerged by grated frames, show more color than wines which have been fermented after the ordinary fashion, in open tanks. This is explained by the fact that the cap, which consists mostly of skins, remains when grated frames are used the whole time submerged in the must, while otherwise it floats on the top.

It follows that the deficiency in color is due: (1) To the incomplete ripeness of the grapes, or overripeness, which causes rotting of the skins. (2) To the small proportion of skins compared with the pulp

and the water of vegetation (watery berries with large seeds). (3) To the fact that the skins are not sufficiently immersed in the must during fermentation.

Wines which are too poor in color may be improved in this respect by the following means: (1) By picking the grapes, if possible, only when perfectly ripe. (2) By planting varieties with small berries, so as to have a greater proportion of skins. (3) By the use of grated frames and foulage. The treatment of wines which are deficient in color should consist, besides the ordinary precautions, in avoiding everything that facilitates the precipitation of coloring matter. For this reason they should be fined as little as possible. Gelatine should not be employed at all for this purpose, but albumen in the proportions as we have given for wines whose alcohol-percentage is low.

It is quite natural that blending wines which are very rich in color with wines which are deficient in this respect, increases the color of the latter; but in order not to alter the natural flavor, the blending should be done with wines of the same character and from the same locality.

The use of vegetable matters, or of fruit juices, for the purpose of imparting color to the wine, should be rejected; some of these substances are, besides, *unwholesome*. In the chapter on *Sophistications* we shall give a detailed account of these substances and the means of recognizing them.

DULL, LEADY, BLUISH COLOR—TASTE OF LEES.

Some wines remain turbid and retain a dull, leady color, even when the after-fermentation is over. There are several causes for such behavior, and it is necessary to look for them and to study them before deciding upon any treatment. Sometimes, even often, the new wines remain turbid because they have undergone an after-fermentation which has disturbed the lees, which had already settled. Such an after-fermentation is due, as we have already explained, to untimely racking, or to the imperfect arrangements of the cellar. New wines also remain turbid if they have been moved without having been previously racked.

In this case the wine should be placed in a cellar whose temperature is constant, and allowed to rest a fortnight. When this time has passed, it should be ascertained if the lees have settled. If the wine has still a dull color, it should be fined by using the methods best suited to its nature.

If the wine is turbid owing to an untimely fermentation, the first thing to be done is to stop this fermentation by means such as are generally applied under such circumstances. If, notwithstanding all precautions, such a wine remains dull, even if all fermentation has stopped, the reason of this defect must be ascribed to the lack of alcohol or of tannin. It is known, indeed, that the coloring matter of wines which are deprived of alcohol or tannin, either settles to the bottom or remains in suspension.

If it is found that alcohol is lacking, the treatment consists in fortifying the wine with one or two quarts of alcohol (70 to 90 degrees) per barrel, or with one fifth or one tenth part of the whole of strong, full-bodied wine of the same flavor, and afterward in fining with the white of a few eggs.

If the wines which remain dull possess a sufficient alcoholic strength, and a satisfactory color to each barrel, an alcoholic solution of about

300 grains of tannin should be added; afterward the wine should be treated with an ounce or two of gelatine. A bluish violet color and a taste of lees is only rarely met with among the wines of the Gironde. This defect is rather met with among certain southern wines, and is due to an excess of coloring matter and to the absence of tartaric acid in the wine. If such wines have much color and more than 9 per cent of alcohol, it is easy to change this color into red by blending them with one sixth to one fourth of a tart wine, which contains, as it is known, an excess of tartaric acid; after that they are treated with 300 grains of tannin, so as to enable them to preserve their color and to undergo the fining processes. If a tart wine cannot be had, crystallized tartaric acid could be used. This acid is soluble in wines. Before using it on a large scale, the quantity which is needed to turn the wine red should be determined by experimenting on a sample; for it should not be forgotten that this acid makes a wine less wholesome.

If the alcoholic strength of a wine is low, if its color is inadequate and blue and dull, it will possess a great tendency to undergo putrid fermentation. In such a case the blue color is indeed nothing but the beginning of decomposition. It is due to a chemical reaction which transforms a part of the potassium tartrate into carbonate of potash. These wines possess a slightly alkaline taste, and if they are left to themselves they spoil rapidly if the air has access to them, but they do not acidify completely. This is the worst kind of a wine. It is possible, however, to prevent this kind of decomposition, which is very rare, even among common wines, by using good processes of vinification, and by making the wine more full-bodied and stronger by the choice of good varieties.

As to the treatment of these wines, several experts have proposed the use of tartaric acid for their improvement. This acid will indeed change their color into red, but it will not prevent the putrid decomposition which threatens them. We prefer to use for this purpose about one sixth part of tart wine, which contains, as we know, a good deal of free tartaric acid, and to fortify afterwards by blending these wines, in convenient proportions, with wines which are full-bodied and possess a high alcoholic strength.

PUTRID DECOMPOSITION—CAUSES OF THE SAME.

Wines undergo a putrid decomposition owing to a great lack of alcohol and tannin. This defect is due to the deficiency in sugar and to the watery nature of the grapes. It is therefore possible to recognize when wine is predisposed to putrid fermentation by its showing a lack of alcohol and of tannin. These wines soon lose their color, and fail to become bright and clear; they remain turbid after the settling of the lees, which, besides, is never complete, and is going on all the time.

The tendency to decomposition is announced by a change in the color they assume—a brick-red, dull hue. Thus wines, though they may be quite young, acquire the appearance of old turbid wines; their red color becomes in the greatest part precipitated, and they retain only a yellowish color. If, in such a stage, they are not immediately fortified, they assume a nauseous, rotten taste, become more and more turbid, and decompose without going through the acetous fermentation.

HOW TO PREVENT DECOMPOSITION.—The tendency toward putrid decomposition (a rare defect, by the way) can be prevented by using all the

necessary means to increase the sugar in the must in a natural way, and thus by a proper choice of varieties raising the percentage of alcohol.

TREATMENT OF WINES WHICH ARE PREDISPOSED TO PUTRID FERMENTATION.—Putrid fermentation can be delayed by the use of the following means:

1. By raising the percentage of the alcohol of the wine by adding tannin, and by blending with a suitable quantity of wine which is full-bodied, has a high alcoholic strength, and is harsh.

2. Should there be no such wine at hand, brandy or alcohol can be used for the same purpose; or, still better, a solution of tannin in alcohol (of which we will give the composition in speaking of the component parts of the wine), thus raising their alcohol-percentage to about ten.

3. By avoiding as much as possible the use of artificial finings, particularly of such substances as precipitate the coloring matter; for instance, gelatine; albumen should be used instead.

4. Do not permit such wines to undergo shaking and motion of long voyages. Avoid the use of sucking pumps, for strong motion accelerates the precipitation of coloring matters. These various precautions may delay the putrid decomposition, but they do not stop it, and these wines can never bear a long voyage unless strongly fortified before shipment.

WINES WHICH POSSESS SEVERAL DEFECTS.—It happens frequently that certain common wines have several defects at a time. In such a case the defect should be treated which is the most prominent.

**FAULTS OR DISEASES OF WINES CONTRACTED AFTER FERMENTATION—
FLATTISH, MOLDY WINES.**

NATURE AND ORIGIN OF MOLDINESS.—The moldiness of wine is nothing else but a crust of microscopical fungi which the botanists call *Mycoderma vini* and *Mycoderma aceti*, and which develop on the surface of wines which are in contact with the air. These growths communicate to the wine a disagreeable odor and taste, as well as light acidity, which is known under the names of *flatness*, *flatfish odor or taste*.

The principal reasons for the growth of these parasites is the direct contact of the wine with the air, which favors their growth; further, the evaporation of a portion of the alcohol on the surface of the wine which is in contact with the air, and the incipient oxidation of the alcohol which remains in the liquid.

The result of all this is, that the surface of the wine becomes very low in alcohol, and having thus lost its preserving principle, it becomes moldy. Moldiness consists, as is commonly known, in the development of a large number of small fungi. This mold has a bad taste, and is impregnated with an acidity which is due to the action of the oxygen of the air on the alcohol, it being thereby transformed into acetic acid.

These changes are more or less rapidly effected according to the alcoholic percentage of the wine and to the temperature of the storage cellar. The weak and ordinary wines which contain from 7 to 8½ per cent of alcohol are first attacked. They begin to mold three or four days after having been exposed to the air. Stronger wines which contain 10 to 11 per cent can resist the mold twice as long as the weak wines. Lastly,

the wines which have more than 15 per cent of alcohol do not mold. During summer the changes are much more rapid.

HOW TO PREVENT THE FLATTISH TASTE.—The flattish taste can be prevented by protecting the wines from contact with the air. To do that they should be kept in casks which are always full or in hermetically sealed and horizontally placed bottles. (Compare *General Treatment of Wines*.)

If we cannot avoid having the casks partly filled, the air which remains in the cask should be neutralized by burning a piece of sulphur wick and by afterwards bunging hermetically. (Compare *Sulphurous Acid, its Uses, etc.*)

TREATMENT OF FLATTISH WINES.—Sometimes it happens that new wines have been neglected by not filling up the casks in which they were stored for eight days or more, and it is only the surface of the wine which has become so altered. By filling up the cask, it is possible in such a case to withdraw the mold which has been already formed, through the bung-hole; afterwards, the cask should be bunged hermetically, and, lastly, care should be taken to fill up frequently, because a new formation of mold would not only impart a flattish taste to the wine, but would also make it turbid and introduce acid ferments, causing it to sour in the end. (Compare *Treatment of New Wines*.)

A barrel containing wine that is considerably moldy, and which has acquired a distinct, flattish taste, without, however, being rankly acid, should be filled up with fresh wine. The mold is allowed to escape through the bung-hole, and then the wine is racked off into a barrel which has been sufficiently sulphured. This barrel should be completely filled. After the racking, one or two quarts of old brandy per barrel should be added to the flattish wine, or the same amount of a strong wine possessing the same flavor as the one to which it is added. Afterwards, the wine should be well fined by using, preferably, egg-albumen (the white of eight eggs and a handful of salt, dissolved in a glass of water), and should be racked again as soon as it has cleared. The object of this treatment is to remove from the wine, by means of racking, the mold which imparts the bad taste; to increase, afterwards, the alcohol, in order to replace that which has been lost by evaporation; lastly, by the use of finings, to precipitate the acid ferments which were produced by the mold. It must be remarked, however, that the wines which have become decidedly flattish can never be cured completely, and if they possessed a fine and delicate flavor, they lose a considerable part of their value. We insist, therefore, that the foreman of the cellar should be careful to prevent this disease, which produces acidity, for often the neglected wines are at the same time *flat* and *sour*.

ACIDITY—PRICKED WINES—ROUGHNESS.

The acidity is due to the fact that the alcohol which is contained in the wine is partly transformed into acetic acid under the influence of the oxygen of the air. (Compare *General Treatment of Wines; Influence of the Contact with the Air*.) All unfortified wines are subject to this change if they remain exposed and in contact with the air. If they are fortified so as to contain 18 per cent of alcohol, whether containing sugar

or not, they undergo no change except that the alcohol decreases through evaporation.

MEANS OF PREVENTING ACIDITY.—Acidity is prevented by treating the wines according to their character, by storing them in convenient cellars (compare *Treatment of Wines*), and by using the precautions indicated in speaking of the flattish and moldy wines; that is, by avoiding all kinds of prolonged contact with the air. Mold is, as we have just said, the forerunner of acidity. However, the wines do not always become moldy before getting sour, particularly if the temperature is high, and if their alcohol-percentage is a high one. Generally the wines turn sour without becoming moldy if they are exposed to the air at a temperature of 77 degrees to 104 degrees; under these conditions acidity is produced very rapidly; this is the reason why the precautions should be doubled during hot weather, and why it should be remembered that this fault is due either to the negligence of the foreman in permitting the access of air, or to the casks being in poor condition and the imperfect construction of the cellar.

TREATMENT OF PRICKED WINES.—The acetic acid which is contained in pricked wines can be neutralized to a great extent by the reaction of several alkaline matters, but in this case there remain dissolved in the wine salts (acetates and tartrates) which are formed by the combination of acetic and tartaric acids, with a part of the alkaline substances which were introduced.

The alkaline matters neutralize by this combination, not only the acetic acid but all the organic acids which are contained in the wine. These neutral salts are not perfectly wholesome; they are to some extent purgatives. Aside from that, it is not possible to neutralize completely the acetic acid which is contained in the wines by using caustic alkalies (potash, soda, quicklime), for by their introduction they decompose the wine, they effect the precipitation of the coloring matters, and impart besides an unpalatable, bitter taste. It is therefore necessary to select for the treatment of pricked wines alkaline substances which are best fit to neutralize the excess of acetic acid without changing the composition of the wine, without altering the color, and which produce by their combinations with the acids the least soluble and the least unwholesome salts.

The alkaline substances which should be chiefly used are: Carbonate of magnesia, tartrate of potash, and lime water.

The following substances should be used only in cases when it is impossible to obtain those just mentioned: Wood ashes (preferably the ashes of grapevines, which contain a great deal of potash); chalk, or pulverized marble; solution of bicarbonate of soda, and of bicarbonate of potash.

HOW TO APPLY THESE SUBSTANCES.—It is advisable to try first on a small sample, say one quart, of the pricked wine the effect of the substances which it is intended to apply. Care should also be taken to use quantities which are proportional to the degree of alteration of the wine. Thus, to one quart of pricked wine there should be added in small portions, shaking the bottle all the time, 15 or 30 grains of magnesium carbonate. In case the wine is considerably pricked, the quicklime

should be slaked in water in convenient quantity; the mixture should be shaken and then allowed to subside until the supernatant water becomes clear; 1.2 cubic inches of this lime water should be added to the wine which has already been treated with magnesium carbonate; after that 0.6 cubic inches of brandy are added, and lastly an albuminous fining, preferably fresh milk, in a dose of 0.6 to 1.2 cubic inches, is added; the bottle is then corked, shaken, and allowed to rest. At the end of three or four days it will be possible to judge the improvement which has been produced by the treatment, by comparing the pricked wine with the treated sample.

This treatment varies according to the kind of wine in which the acid taste is found. If the wine is not only pricked, but also tart, fifteen grains of tartrate of potash, besides magnesia, should be added; if the wine has a dull color after the milk has been added, a small quantity of gelatine solution is also used; lastly, if the wines are turbid and difficult to clarify, there should be added before pouring in the milk and the gelatine solution a small quantity of tannin.

It is hardly necessary to mention that the quantity of each substance to be used should be adequate to the condition of the sample, and that the same proportions should be used on a large scale.

If carbonate of magnesia cannot be obtained, the quantity of lime water should be doubled; and lastly, in case lime is not at hand, marble or powdered chalk could be used, but very cautiously; also the ashes of the shoots of vines, but in smaller quantity, or solutions of bicarbonate of soda or potash. The last mentioned substances require much precaution in their use. We should avoid employing them in cases where the wine is only slightly pricked. As far as my own work is concerned, I prefer the carbonate of magnesia to all other alkalies, because it does not act so strongly on the color and does not impart to the wine the bitterness and unwholesome properties which potash, lime, and soda salts do. (It is a well known fact that the carbonate of magnesia is used in medicine as an antidote for the acidity of the stomach.)

To these wines brandy is added in order to replace the alcohol which was destroyed by the formation of the acid. As far as the fining is concerned, the preference given to the milk in this case is due to the fact that milk has an alkaline reaction. It helps, therefore, to neutralize the acid taste of the wine, and clarifies it at the same time; but milk is alkaline only when it is fresh; the skimmed milk of the day before is acid—it should not be used. Lastly, the tartrate of potash and carbonate of potash are used in the treatment of pricked or tart wines. Gelatine and tannin neutralize the tartaric acid, and facilitate the clarification and precipitation of acid ferments.

Wines whose acid has been neutralized should be fined and racked as soon as they have completely cleared. This result can be obtained by following the method above indicated. The more acid the wines are, the less alcohol they contain, because the acid has been formed at the expense of the latter; therefore, it becomes necessary to fortify them, either by adding alcohol, or, if the change is not a deep one, to blend them with strong, but ordinary wines. Should this change, on the contrary, be very great, and consequently their alcohol-percentage very low, it will be more profitable to convert them into vinegar.

TASTE OF THE CASK.

The taste of the cask should not be confounded with the taste of the wood, as this taste, when imparted to the wine, is due to the aromatic substances contained in the oak. The wines acquire it generally in new casks. The taste of the cask is a bad one, due to a disagreeable essence of taste and smell, produced by a peculiar change in the wood of one or of several staves, or of the bottom of the casks. This defect is very rare. It is impossible for the cooper to prevent it, and reject the staves which impart the bad taste, because there is no sign by which they may be recognized.

The treatment of wines which have contracted a bad taste of the cask consists in transferring the same as soon as possible into good and sulphured barrels, in order to remove them from the contact with the wood which has imparted to them the bad taste. This bad taste may be diminished by agitating the wine for five minutes or more with a quart of olive oil. This should be afterwards taken out by means of a pipette. After that, a good dose of fining—white of eggs, or gelatine—should be applied suitable to the wine. Following this, after a week or fortnight, the wine should be racked. The object of this treatment is to secure, by means of a non-volatile oil, the volatile essential oil which seems to be the reason of the bad taste. And, indeed, the olive oil which is used for this purpose, acquires a decided taste of the cask. It is possible, by treating the wine in this manner, to attenuate the taste of the cask; but it is seldom that it can be completely eradicated.

MOLDY TASTE—BAD TASTE PRODUCED BY FOREIGN MATTERS, ETC.

The wine acquires a moldy taste by remaining in casks whose staves are moldy on the inside. The presence of mold is due to carelessness and negligence, which, in this case, consists in leaving casks empty without sulphuring and bunging them hermetically. (Compare the article on *Empty Casks*.) The mold of the empty cask is a whitish moss, which consists of microscopical fungi; it develops under the influence of humidity and darkness; its disagreeable taste seems to be due to the presence of a certain essential oil.

This defect is prevented by carefully inspecting the casks before filling them, and by avoiding the use of those whose odor indicates moldiness.

Wines which have accidentally acquired a foreign taste, either by having been kept in casks which had originally held "liqueurs" with a very decided taste and flavor, such as anisette, absinthe, rum, etc., or by their contact with odoriferous substances, owe this taste to the solution in the wine of a portion of the essential oil which is contained in these substances, and should be treated in the same manner as the wines which have acquired the taste of the cask. First of all, they should be removed from the infection as soon as possible by drawing them off in other casks.

SLIME.—Under this head a property and alteration are indicated: a property, if the mellow, oily, and fruity taste of certain wines is understood; an alteration, if a certain fermentation is meant which makes the wines ropy, like oil. This alteration, which is really nothing but a certain kind of fermentation, is peculiar to white wines, which hold in suspension nitrogenous matters which contain only a small quantity of

tannin. This is not a serious defect and is easy to remedy. It is sufficient to add to a barrel of such a wine several gallons of wine in which tannin has been dissolved or a solution of about three hundred grains of tannin in alcohol. The whole should be well mixed and shaken as in the case of the application of ordinary finings. (Compare *Tannin*.)

The tannin which is mixed with the wine precipitates the slimy matter by combining with it. Thus a real fining is effected by the chemical action of the tannin. These wines should be racked a fortnight after the treatment with tannin.

BITTERNESS.—Bitterness, which is often a natural defect (we have already spoken of it), becomes an accidental defect if it develops in old wines which before had a frank taste. In this case it is almost always the beginning of decomposition. This bitter taste is chiefly due to the compounds which are formed by the decomposition of color, and by the precipitation of mucilaginous matters which give to the wine the mellow, fruity taste; and, indeed, it has been noticed that the wines acquire bitterness in the same proportion as they lose their fruity taste. It is possible to diminish this bitterness by fortifying. We may regenerate the bitter wines only by blending them with wines of the same character, young and strong ones which have not reached their full maturity. The blend should be fined with albumen and racked after a fortnight. Thus these wines can be improved; but at the end of several months the bitterness reappears. These wines should be, therefore, consumed as soon as possible.

ROUGHNESS.—The rough taste which certain wines acquire in aging is a sign of decomposition. We have some reason to believe that this defect is due to the presence of acetic acid and to the precipitation of the mucilaginous substance which gives to the wine the mellow taste; indeed, this defect is most frequently observed in the case of old wines.

The proper treatment to diminish the roughness consists in destroying the acetic acid, by using sixty to one hundred and twenty grains of magnesium carbonate per gallon (compare *Pricked Wines*); or, if the roughness is not very prominent, to blend such wines with young and strong ones which have a frank taste; after blending, the wine should be fined, in order to make the mixture more complete. As fining the white of egg should be used with preference.

TASTE OF "WORKING" OF THE LEES, ETC.—The taste of "working" is due to the presence of carbonic acid gas, which is given off from the wines as soon as they undergo an after-fermentation, either owing to the sugar which they still contain, or to mucilaginous substances. The principal reasons for the "working" are the presence of sugar and of mucilaginous substances, together with the ferments. Under the influence of a higher temperature, the "working" begins. The taste of lees is due to the rising of the lees and of the sediments. The taste of "working" wine and that of the lees can be prevented by conducting the vinification under favorable conditions; by keeping the wines at a constant temperature, and by separating them from the lees by timely racking.

The "working" can be stopped by racking the wine in other barrels, which have been previously sulphured. During the racking the wine should not be allowed to come in contact with the air. After racking,

the barrels should be placed in a cellar whose temperature is low and constant. Should it happen that the wine be turbid, it should be fined with the substances which suit its character best; the wine should remain in contact with the fining only during the time which is strictly necessary to effect its clarification. The details of these operations have been mentioned in the paragraphs on sulphurous acid, finings, and special treatment of each kind of wine.

DEGENERATION—PUTRID FERMENTATION OF WINES.—The degeneration announces itself in the wine by many signs a long time before it really sets in. These signs are loss of the fruity taste, bitterness, roughness, etc., but the true symptoms of degeneration in old wines are the more abundant precipitation of their blue coloring matter, their turbid condition, and their slightly putrid taste. The chief causes of this alteration are the same as those which we have mentioned in opening, of the tendency of the new wines to putrid decomposition; namely, a low alcohol-percentage, together with a lack of tannin. It is known that with time the tannin is transformed into gallic acid, also the alcohol decreases through slow evaporation, and thus it happens that wines which are too old have lost a portion of their preserving elements—alcohol and tannin.

How long wines may keep is very difficult to say; like animated beings, they show a great diversity in their character. Very weak wines begin to decompose the first year, while others, which are stronger, improve during four, six, ten years, and perhaps longer. As soon as it is apparent by the aspect and by the taste of a wine that it has begun to degenerate, it is important to stop, as soon as possible, the beginning of the decomposition. This can be effected by the use of a solution of tannin in alcohol (compare *Tendency Towards Putrid Decomposition* in the paragraph on *Natural Defects*); but it is more advisable to blend such wines with young, strong wines of the same character. (Compare *Diseases of Bottled Wines*.)

CHAPTER VI.

THE LEES OF WINE.

Composition of lees. Wines extracted from the lees. Methods of extraction. How to avoid the bad taste and to press the lees economically. Presses. Use of the dry lees. Pearlashes. Crude tartar.

The lees should not be neglected, for, in the absence of timely precautions, the wines which are extracted from them acquire a bad taste, due to the fact that they have remained too long a time in contact with the sediments.

To prevent this alteration, which would deprive the liquid of all its value, the lees should be treated with very particular attention, and should be kept in cellars which are perfectly protected from changes of temperature.

Before being separated the lees contain from 30 to 90 per cent of wine. The lees of wines on which finings have been used contain about 70 per cent of wine, not comprising that which can be extracted by pressure.

The dry portion of the lees contains a large quantity of insoluble matters, of tartar, several other organic and inorganic salts, various com-

pounds, ferments, mucilage, residues of animal or vegetable matters, albuminous or gelatinous, which have been used as finings.

M. Bracounot, a distinguished chemist, who has analyzed the dried lees, has proved in them the presence of the following substances: bitartrate of potash, tartrate of lime, tartrate of magnesia, phosphate of lime, sulphate and phosphate of potash, organic nitrogenous matter, fatty matter, coloring matter, gum, tannin.

This composition of the dry lees varies according to their age and the nature and variety of the wine from which they have been deposited; but in all of them the salt which is met with in great abundance is the bitartrate of potash (tartar). The lees of mellow wines contain mucilaginous substances, and in the lees of sweet wines great quantities of sweet matter are found which can be utilized. We are going to speak later of the various uses of dried lees.

If intelligent care has been exercised, it is not only possible to draw off all the liquid above the lees, but also this wine will have no bad taste.

PRACTICAL TREATMENT OF THE LEES.—The empty barrels which are destined to hold lees should be washed and rinsed just as if they were destined to contain bright wines. In these barrels a piece of sulphur wick should be burned. In proportion as the racking of the wine is carried on the lees are emptied in a pail and *immediately poured* into the barrel which is destined to hold them. (Care should be taken when the lees are emptied in the pail, not to introduce into the latter earth, mold, etc. If the circumference of the bunghole is dirty, it should be brushed before taking out the bung.) As soon as the barrel is filled with lees, it should be placed like wine with the bunghole upward, in a close cellar.

If the barrels cannot be filled completely the same day, they should be bunged hermetically after having burned in them a new piece of sulphur wick. This operation of sulphuring should be repeated every time that new lees are poured into the barrel, the barrel having remained several days only partly full. This constant sulphuring is not only to prevent the access of the air which would acidify the wine, but also to prevent a renewed fermentation which could be possibly started by the ferments contained in the lees. In a word, the barrels which contain lees, without being quite full, should always be well bunged, sulphured, and protected from variations of temperature.

After the barrels with the lees have been placed in a cellar which has an even temperature, they should be filled up regularly every week with clear wines; after fifteen days of rest the clear liquid should be drawn off for the first time; this operation should be repeated every month; thus, by simple racking, the whole clear portion of the liquid can be drawn off, if using the precautions which we are going to describe later. By following this method any after-fermentation is avoided, to which the lees are very subject, particularly in summer; also, the disagreeable taste of lees is avoided, and harshness and bitterness, which the wines that have remained a long time in contact with the sediments may acquire.

Faulty wines, whatever their defect may be, also those which have been recovered from breakage, from leaks which have sprung up unexpectedly in the casks, or those which have been collected from the floor,

should never be poured in with the good lees, for they would spoil them. Wines belonging to this class should be poured into separate barrels and treated each according to the fault which it has.

Separation of the Lees from the Wine by means of Glass Siphons, etc.—The lees which have not been separated from the wine, and which are kept under the conditions we have described above, on standing, get rid of a large portion of the foreign substances which they contain, for these are insoluble and specifically heavier than the wine.

The separation of the wine from the lees can be effected in two ways—either with the help of a glass siphon, or of a stopcock. For the first separations transparent siphons made of glass are preferred. The siphon is introduced through the bung-hole into the barrel to a depth of about eight inches; two empty well rinsed and well drained pails are placed under the longer leg; then the liquid is sucked in, holding the siphon up so that it should not sink too deep into the barrel; with the help of a candle which is placed above the siphon, it is possible to ascertain if the wine which runs out is almost clear; as long as it remains clear the siphon is gradually immersed until the level of the turbid wine is reached. As soon as the first pail is full the second must be placed under the leg of the siphon, without stopping the outflow of the liquid. In order to apply this method, the presence of two men is necessary (unless one has great experience), of whom one watches and holds the siphon, and the other pours the clear wine into a rinsed and sulphured barrel. As soon as the liquid begins to show turbidity the outflow is stopped, and the same operation is performed with other barrels.

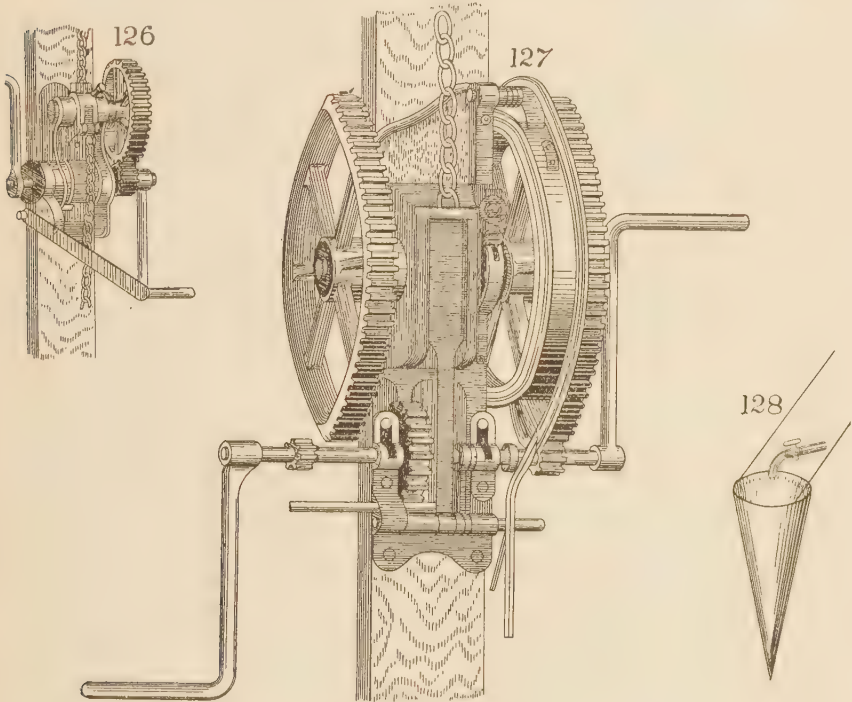
When the lees and wine in all the barrels are separated, the lees are collected in a barrel which already contains the greatest quantity of them. Before filling the barrel it is important to burn in the same a double square of sulphur wick, in order to prevent an after-fermentation. In order to collect the lees in an easy manner, they are emptied into great pails, if there are not more than ten gallons in each barrel; but if there is a greater quantity of them, the barrels are raised on other barrels, and the lees emptied by means of a stopcock, if they are not too thick; otherwise through the bung-hole. In this latter case, the bung-hole should be cleaned from time to time with a small stick, to facilitate the outflow.

The use of a stopcock is preferable to that of a siphon if the lees are thick and if the barrels which hold them are placed on the floor. By separating the lees from the wine with a stopcock, it is possible, at least for the first separation, to avoid the piercing of several holes in the bottoms of the barrels. It is the deterioration of the bottoms produced by these holes which often makes the siphon preferable to the stopcock. By piercing the end or head, the bottom is not spoiled, and besides the advantage is there that it is possible to extract with the stopcock a greater quantity of wine than with the siphon; but this wine is generally less bright than that which is drawn off cautiously with the help of a siphon. This system allows one man to perform all the necessary operations without further help.

Before beginning the separation of the lees and wine with the stopcock, it should be ascertained by means of some gimlet holes, or of a long glass tube, where the clear wine begins; then a hole for the stopcock is bored just above the surface of the lees. If, as we have already

said above, the barrels have not yet been used for the lees, and if the latter are separated for the first time from the wine, the hole for the stopcock may be bored instead in the middle piece of the head on the same level in one of the side pieces a little farther than one inch from the cross groove. Thus the bottoms are not spoiled.

The wine which has been drawn off from the lees should be immediately poured into rinsed and sulphured barrels, and should not be allowed to stand exposed to the air.



HOISTING MACHINES.

126. Windlass, system A. Suc. This windlass should be fixed on a post or pivot.

127. Windlass, system A. Suc. Double speed, for hoisting heavy packages. It must also be fixed on posts. This windlass is provided with a brake for the purpose of letting down freight, and a ratchet for holding the lifted weight when necessary.

128. Conic filter, made from woolen cloth or felt. This filter is fixed to a hoop of iron, which can be suspended wherever necessary.

The lees should be collected in the same way as we have already described. Care should be exercised in collecting the lees from which the wine has been already extracted several times, and which have yielded a small quantity of wine, not to fill the barrels with them except after thorough sulphuring. Then we must not move these barrels, because the movement would disturb the sediments and would impart a bad taste to the wine which is still on the lees, and even give rise to putrid fermentation, particularly if the lees contain large quantities of albumen and gelatine which were used as finings. It is hardly necessary to add that the barrels used for lees should, as soon as they have been

emptied, be thoroughly rinsed, drained, and sulphured; otherwise the lees would adhere to the staves, where they would dry.

Classification of the Wines Extracted from Lees.—The wines which have been extracted from the lees are often wanting in clearness; it is generally more difficult to clarify them completely by using the ordinary methods than the wines of the same character from which they originate; it has also been observed that these wines have considerably less color and show a lower percentage of alcohol than ordinary wines of the same origin.

The difficulty met with in obtaining their complete clarification consists in the presence of large quantities of insoluble matters which are held in suspension, and in the relative weakness of these wines in alcohol and tannin. The decrease of the color is due to the mechanical action of the insoluble matters contained in the lees. These matters settle and carry down with them a portion of the coloring matter which is in solution. It follows, therefore, that the older the lees are the less intense is the color of the wines which are extracted from them.

If the wine extracted from the lees is a red wine, and if it is desired to clarify the same completely, it should be treated with a strong dose of albumen (the white of ten eggs per barrel), which has been well beaten in half a pint of salt water. If the alcohol-percentage of such a wine was below nine, to each barrel there should be added one or two quarts of brandy, or of alcohol, before applying the finings. Gelatine should never be used for fining red wines of this kind, as the color would suffer too much.

The white wines extracted from the lees can be treated with albumen, if their alcohol-percentage is high. The weak white wines should be treated with a strong dose of gelatine; but before applying the gelatine it is necessary to add some tannin, either in the form of a couple of gallons of wine which has been treated with tannin, or in the form of three hundred grains of tannin dissolved in alcohol.

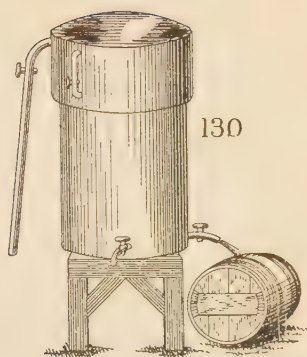
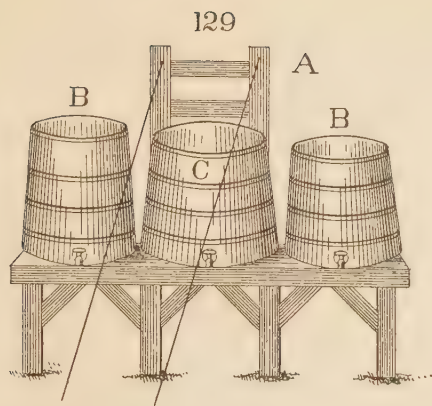
The wines which have been extracted from the lees should remain in contact with the finings so long as is strictly necessary to precipitate the finings used (about ten days). After this time they should be carefully racked. When reaching perfect brightness these wines should be treated, according to their character, in the same manner as those from which they have been extracted.

PRESSING THE LEES.—After having drawn the wine from the lees three or four times, it is possible by pressing to recover a still further quantity, as the lees contain, on the average, not less than 50 per cent of liquid.

Economical Arrangement of a Press for the Lees.—The pressing of the lees is done in small sacks, which are approximately one and one half feet long. The material of these sacks should be *cotton cloth*, because the sacks which are made from hemp impart to the wine (even if they have been used several times) a disagreeable taste; this sack taste is very injurious to the quality of the wine. Cotton, which does not impart any bad taste, should always be chosen.

The lees from one vineyard, or from one cellar, can be pressed without any other expenses than the purchase of a sufficient number of sacks. The cloth should be fine, and have regular and tight meshes.

In order to arrange a cheap press for the lees, an empty barrel is taken, and its bottom staved in; this bottom is now fastened together by two crossbeams; when this is done, a little less than half an inch of wood is



129. Press tanks and frames for lees. For description of its working see text. *A*, fulcrum for the lever; when it cannot be fastened to the wall, bars are placed in front or behind *B B*, for a similar purpose; the lever may then be used by the aid of blocks of wood in proportion as the contents of the sacks are compressed. When the apparatus is permanently established, a pulley is placed above the weight on the end of the lever, in order to hoist it when necessary; it is then sufficient to place new blocks of wood under the lever in order to reestablish the pressure.

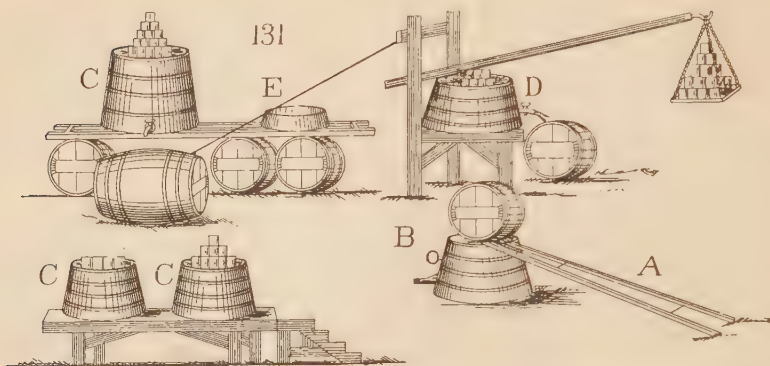
130. Closed wine filter. Closed filter lined with copper on the inside. This kind of filter has one, three, or five sacks, according to the diameter. These sacks are made of wool and sometimes of special tissues, according to the liquid to be filtered. They can be filled without the liquid coming in contact with the air, by means of an india-rubber tube with a stopcock at its end; this stopcock is attached to the filling-cock. A glass gauge is attached to the outside to indicate the contents.

taken off from the periphery of the bottom, so that it will easily go into the barrel, and thus answer for a cover. Afterwards, in one of the staves of the barrel, a gimlet hole is bored about half an inch above the bottom which remains, in a manner that this hole just touches the bottom in the interior of the barrel. Lastly, a stopcock is introduced into the gimlet hole. This barrel, which is destined to hold the sacks, is now placed alongside a wall on two barrels, which are covered with a board; if necessary, the barrel is raised to a sufficient height so that below the stopcock an empty barrel, destined to receive the pressed wine, can be placed.

In order to empty the lees into the sacks rapidly and easily, the full barrels are raised on a scaffolding, and emptied into the sacks. During this operation the sacks are held open by means of a piece of twisted wood; as soon as a sack is full, it is solidly tied up with a knot easy to undo again. In this way one sack after another is filled into the barrel until full.

During all this time the stopcock remains open, and the wine runs off in proportion as it is filtered into the empty barrel, which has been previously rinsed and sulphured.

When the barrel is filled with the sacks the cover is placed on top of them, and very gradually charged with weights; afterwards, the pressure is continued with a lever. The pressing of the lees should be carried on very gradually; thus, the lever should be used only after the sacks have been drained during several hours without the application of pressure; the lever should be also charged with weights after several hours; better still on the following day.



131. Filter presses; *a*, a bridge used for emptying the first lees in the tub *b*; in *c* is a utensil hooked to the pail—a kind of tin basin with double bottom of rectangular form—which possesses one or several iron rings which have the diameters of the sacks; *c, c, c*, these are small vats, which have an inner diameter of three and one third feet, and are about two to two and one half feet high; the first one contains about ninety gallons, and those which are two and one half feet high contain about one hundred and forty gallons; *d*, press for the lees with long lever; *e*, pail which is used for putting in the sacks, or to press them.

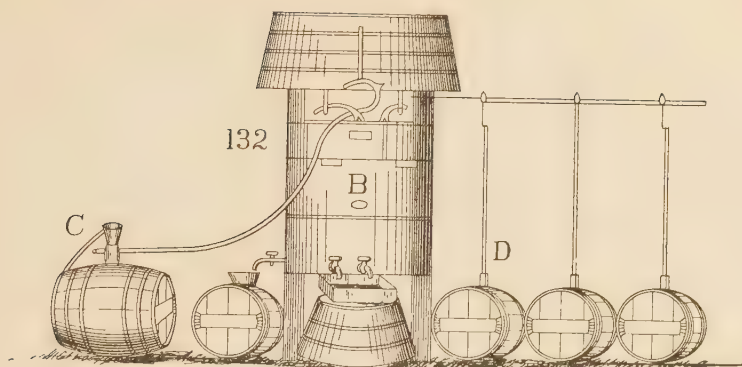
When there is no more liquid in the bags, which may be recognized when, notwithstanding the use of the lever, no more wine drops from the stopcock, the sacks are taken out of the barrel.

When the lees are not very compact there remains little masses of solid substance in the bottom of the sacks; in this case they may be filled again without taking out the solid residue and pressed a second time. After that they should be thoroughly rinsed. Lye should be never used for this latter purpose.

This simple arrangement, which does not imply any other outlay than the purchase of sacks, is sufficient for the small wine maker who wants to utilize the lees of his wines without incurring unnecessary expenses.

FILTERS.—It has been tried to filter the lees by using strainers of various patterns; some manufacturers of filters announce, in advertisements, that they extract by means of these filters *all the clear wine which is contained in the lees*. This is nonsense. All practical men know by experience that if a liquid is filtered which contains too much sediment, the filters are the more dirtied, and the more turbid and thick the liquid is; it follows that if the filters can be used to clarify the lees of old wines, these lees are practically nothing but *turbid wines*. But the real thick lees—lees from new wines and from those which have been treated with finings—are much more economically treated by the processes we have described above; if an attempt is made to filter such lees there remains on the strainers a kind of mud which contains still, on the average, 40 per cent of wine, which it would have been possible to extract by applying pressure.

DRY LEES.—The dry lees possess some value; they can be sold to the manufacturers of tartar, if they are made from the first lees; otherwise, they can be dried completely in the sun and sold to the manufacturers of pearlashes. But as the quality of these lees is rarely sufficiently



132. Automatic filter arrangement. The liquid is poured into the closed vat above, either by a stopcock above or from below, with the help of the forcing apparatus *c*; a gauge indicates the height of the liquid in the vat; regulating stopcocks slacken or stop the outflow of the liquid, according to the yield of the filters, which are located in *c*. The clear liquid flows out at *d*, and bungs of a special design distribute the liquid equally between several barrels which are placed on the same level; the liquid which runs off at the beginning of the filtration escapes through the stopcocks in front; if necessary, it is again forced into the apparatus by means of the airpump *c*.

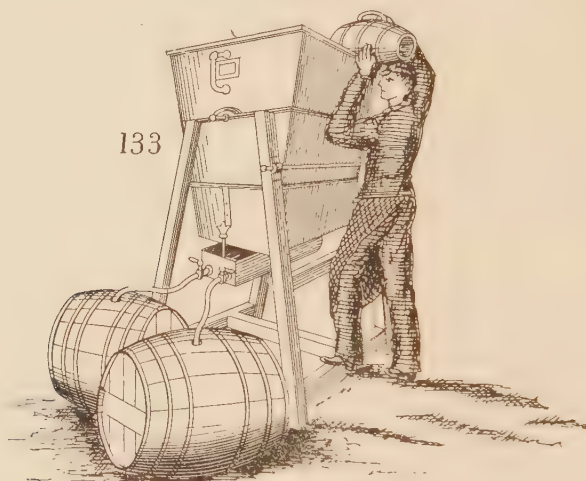
high for this purpose, their sale would not cover the expenses of shipping, unless the manufactories are very near.

Pearlashes are nothing else but the ashes resulting from the combustion of the dry lees, which is effected in specially constructed furnaces. The lees of higher quality which have been dried completely, yield approximately one thirtieth of their weight of this alkali, which has a gray-greenish color. In case of necessity it is possible to manufacture pearlashes on a small scale without any special furnaces, simply with the help of a stove possessing a very large firegrate. In this case it is important to modify the stove in a manner such that the combustion of the dry lees, which is effected with difficulty under the ordinary circumstances, can be carried on with ease. This can be done by regulating the air supply, and by stimulating combustion through the addition of highly inflammable substances. If there is no market in the neighborhood for the ashes or for the lees, the latter can be used as a fuel by mixing them with coal. Dried in the sun and afterwards pulverized, the lees make also a powerful fertilizer, which is excellently adapted for meadows and all kinds of crops.

The dry lees which contain gelatinous matters, owing to the use of finings, burn only with difficulty in ordinary furnaces, because the gelatine has the property of becoming liquid as soon as the lees are heated, and thus the fire is extinguished. The lees which contain albumen do not show the same disagreeable quality, for albumen solidifies when heated. Anyhow, dry lees which consist partly of finings are less rich in pearlashes and tartar than the lees from wines which have not been treated with finings.

Pressed lees, and particularly the first lees from the sweet wines, contain considerable quantities of sugar, which is possible to utilize by fermenting and distilling. This operation can be profitably carried on only when their value as crude tartar is equal to zero.

TARTAR.—This substance can be extracted from the first lees after they have been dried. For this purpose the dry lees must be mixed with water. The process of extraction, however, requires manipulations, the details of which do not enter the scope of this work; we will only say that the tartar is much more soluble in boiling water than in cold water; this property is made use of to extract the tartar from the lees and to refine the crude tartar which is contained in the pressed lees, and which thus becomes *cream of tartar*; but the processes of extraction and of refining require a special plant, which costs a good deal of money; therefore, the wine makers generally sell the crude tartar to the refiners, who extract the cream of tartar.



133. Filtering apparatus with frames. System of L. Mesot.

After the lees have been well mixed with water, the mixture is heated until the tartaric acid has been dissolved; often when the lees have remained slightly moist they contain still a small quantity of alcohol, which could be recovered by passing the first vapors which rise from the boiler through a worm, cooled by water. When the tartar is dissolved the liquid is filtered; on cooling, the tartar crystallizes out.

In order to accelerate the work, the water which has already given a crop of tartar is used again to leach out the lees. According to Batileat, who first tried to utilize the salts which are contained in the lees, the tartaric acid of the tartar can be obtained by transforming the latter into tartrate of lime. For this purpose it suffices to saturate with lime the liquids which contain tartar; thus a precipitate of tartrate of lime is formed. To sum up, it is possible to utilize in the following manner, and to extract from the lees according to their nature and consistence, the following substances: (1) clear wine by racking; (2) wine by pressing the lees; (3) alcohol by distilling the lees which have not been pressed; (4) pearlashes; (5) tartar; (6) manure; (7) fuel.

CHAPTER VII.

BLENDING AND THE BOUQUET OF WINES.

General remarks on the blending of wines. Flavor and natural bouquet. Artificial bouquet. Nature and composition of the bouquet.

GENERAL REMARKS ON THE BLENDING OF WINES.

The object of blending is:

1. To impart a uniform flavor to wines which possess the same character, which come from the same locality and sometimes from the same vineyard, but which have been fermented at different times.

2. To improve the wines by mixing those which possess opposite qualities and faults, *i. e.*, to give to a wine a quality which it does not possess, by mixing it with another that has an excess of this quality.

3. To compose good tasting wines from brands, each of which, if tasted separately, show some defect.

Blending which is done solely in view of saving money, without regard to the respective qualities of the wines which enter the blend, is not worth while speaking of. In most instances it will only prove harmful to the keeping qualities of the blend.

It is difficult to define precisely the kind of blending which a wine requires without first having tasted it, and without knowing for what use it is destined. Blending is mainly a practical business, which requires good judgment, and which should not be done haphazard.

BLENDING FINE WINES.—Great wrong is done to a fine wine which shows good promise for the future, and which dates from a good year, by blending it with other wines of a different character, particularly if the wine has not yet reached its maturity, and if its bouquet and flavor are not yet well developed. Experience has proved that such a wine, even if blended with old wines of good quality, never reaches the degree of perfection which it would have attained had it been left alone. It has been found that such a blend loses its fruity taste more rapidly, and is more apt to deposit sediments in the bottles. Nevertheless, it sometimes happens that such blending becomes necessary. This is the case when a wine has been kept too long in the barrel and has deteriorated by losing its fruity taste, thereby becoming harsh and dry. Blending also becomes necessary when the wine comes from an indifferent vintage, and when it is too poor in body or too tart or too weak to keep a long time without deteriorating. If the wine has deteriorated by having been too long in the barrel, it will be necessary to blend it with wines of the same kind, which, if possible, should come from the same vineyard. They should be also at least one to two years, and at most three years old, and should be very mellow. As to the quantity of the wine which has to be used, it should vary according to the degree of the deterioration of the old wine, and the time which it is intended to keep the blend without using it.

When wines which are low in body and in alcohol have to be treated, their keeping quality being doubtful, they should be blended with young and strong wines which are rich in body, and those which, if possible, possess the same flavor.

What we have just said applies only to weak, delicate wines which possess flavor and bouquet, but not a very decided tartness. As far as the weak and tart wines are concerned, wines which promise well should not be sacrificed to fortify such wines, for the excess of tartaric acid which the tart wines contain would entirely destroy the mellowness of the wine used for blending.

Before blending the wines which are too tart with other wines, it is advisable to neutralize their excess of tartaric acid in the manner already described in the chapter on the *Treatment of Faulty Wines*.

In blending wines of a high quality we should observe the following:

1. Do not leave them in prolonged contact with the air during racking.
2. Do not blend them with wines which are yet "working," which taste sweetish, or are somewhat faulty.
3. Do not leave them to themselves if they are not perfectly bright.
4. Avoid using large quantities of finings on wines which are low in alcohol and tannin. After having been blended with stronger wines, these weak wines should be well stirred, in order that the mixture should become a complete one; they should be always clarified with albumen; the whites of not more than five or six eggs should be used.

BLENDING ORDINARY WINES.—We have said already that the object of blending is to improve the wines. We must, therefore, by means of blending, try to impart to ordinary wines the qualities which are prized in wines of high quality. It is known that these latter differ from ordinary wines by the suavity of their bouquet and their flavor—by their mellowness and the fruity taste which they retain when aging. The ordinary wines (we don't speak here of wines which are faulty, but of indifferent brands, which are met with in many wine-growing districts), which contain sufficient alcohol to prevent them from spoiling, but which do not possess either bouquet or any decided flavor, have seldom a fruity taste. It happens sometimes that they are mellow when new, but rapidly lose this quality, and become dry in their second year.

It is therefore desirable to impart to them, by the aid of convenient wines of the same age, bouquet, flavor, and mellowness, or at least to deprive them of their dryness, which process is a difficult one. It is, however, possible to reach the desired aim approximately, by blending such dry wines with wines from the same vineyard which possess a decided bouquet and flavor. All these operations are of a very delicate nature, and it is impossible to give any definite rules, on account of the great variety of wines.

ARTIFICIAL BOUQUETS.—Artificial bouquets are made by the addition of aromatic substances of essential oils, from which the aroma is extracted by means of alcohol. The extraction of the aromatic principle can be either by digestion, distillation, or by means of non-volatile oils, which are afterwards dissolved in alcohol, etc. After all, these processes differ according to the peculiar character of the aromatic substances which are employed.

The aromatic substances which are mostly used to impart an artificial bouquet to dry wines are, if we begin with the most common and most powerful ones: iris root, raspberry, vine blossom, clove, reseda, muscat nut, bitter almond, sassafras, etc. The last mentioned substances are rarely employed alone, and play only a secondary part. They are

usually mixed with iris or with raspberry, the aromas of which are quite distinct.

Iris.—There are two varieties of iris. Only the roots are used, which are white, and have a diameter of at least three quarters of an inch. They possess very irregular and distorted forms, and occur in the trade in pieces, about two inches long, which are now freed from the rootlets. They are particularly used in perfumery.

The Florentine iris root, which grows in Italy and the south of France, has a distinct odor of violets. The German iris is often sold under the same name; a variety which grows in the north of France, Germany, etc. The form of the roots is approximately the same, but the connoisseur has no difficulty in distinguishing the German from the Florentine iris; the latter possessing a less glossy and fatty texture, a greater number of rootlets, and particularly a much more penetrating odor.

The aroma of iris can be extracted only with difficulty and incompletely by distillation. It is also obtained by infusing the roots in alcohol, after having reduced them to a pulp by means of a rasp. This operation is very tedious, but indispensable. Iris can also be obtained in commerce in the form of a powder, but when the roots have been powdered long since, they have generally lost a part of their aroma; sometimes, also, the powder of the iris is adulterated with foreign substances.

Tincture of iris is prepared according to the following prescription: Spirits of wine (85 degrees), two and one fifth gallons; Florentine iris, two and one fifth pounds. The vessel containing the mixture should be corked, then shaken for some minutes, and placed in a spot where the temperature is not below 68 degrees and not above 95 degrees. The liquid should be shaken from time to time during a fortnight; then the residue is filtered and pressed. This tincture has a distinct odor of violets, and a harsh and bitter aftertaste.

In order to impart a bouquet to the wine, the tincture of iris can be used alone in very small quantities; rarely more than one tenth of a pint to twenty-two gallons of wine are used. Very often some few drops of essential oil of cloves, or of some other aroma, are added.

Raspberries.—The preparation of alcohol with the flavor of raspberries is very simple. Ripe raspberries are chosen, picked over, stemmed, and introduced into a barrel with a large bung-hole. Twenty-two pounds of the berries are mixed with two and a half gallons of spirits of wine (85 degrees); they are macerated for twenty days, then the liquid is drawn off and filtered. Thus obtained the liquid possesses a very agreeable aroma and a rosy color. Now the berries are crushed, a new quantity of brandy (strength 50 degrees) is added, and the maceration continued for a month; after that the residue is pressed. This second extract has an odor and taste less delicate than those of the first extract; it is also deeper colored. This liquid should be filtered, or, even better, distilled on the water bath; thus the essence of raspberry is obtained. The first extract is preferable in all respects. This aroma is generally used alone; a good deal of it is used in the manufacture of sparkling wines. Sometimes other aromas are mixed with the essence of raspberries. The quantities of raspberry essence which are used to impart an artificial bouquet vary, according to the flavor of the infusion, from one twenty-fifth to one fifth of a pint to twenty-two gallons of the wine.

Essence of Cloves.—The essential oil of cloves can be extracted either by pressure, maceration, or by distillation. In commerce, this oil occurs under the name of *essence of cloves*. To produce the bouquet this essence or concentrated spirits of cloves are used. To obtain the latter, crushed cloves are distilled with alcohol of 85 degrees. The proportions are ten ounces of cloves to one gallon of alcohol. In default of a still, the aroma can be extracted by infusion, macerating three ounces of crushed cloves in one quart of alcohol of 85 degrees. The mixture should be stirred and filtered at the end of eight days.

Essence of cloves alone is seldom used. By adding a very small quantity of this aroma to the iris extract, a good result is obtained, and the perfume mixes better with the wine, because the essence of cloves is heavier than water.

It must be said, however, that it is never desirable to have the aroma of cloves the prevailing one.

Vine Blossoms.—This perfume is collected while the vines are in bloom. The blossoms are extracted with alcohol of 85 degrees; three ounces of blossoms to one gallon of alcohol are used. After eight days the liquid should be filtered or distilled on the water bath. This essence, which is very volatile, is used in the proportion of one tenth of a pint to twenty-two gallons of wine.

Reseda.—It is difficult to obtain the essence of reseda; the flowers should be picked off the stems and put on cotton or pieces of wool, which have been impregnated with oil. This oil should not be allowed to become rancid (ben-oil is chiefly used for this purpose); the flowers are renewed at the end of four days until the cotton or wool is very fragrant. It is pressed afterwards and the oil shaken with alcohol of 85 degrees. The essential oil dissolves in the alcohol, which is afterwards separated from the ben-oil. Thus a reseda extract is obtained which is used in quantities of one tenth of a pint to twenty-two gallons of wine. Most frequently it is mixed with other perfumes.

Muscat Nut.—Muscat nut is used, either in the form of the essence, which is obtained by distilling over a fire, in quantities of half a pound in two and one fifth gallons alcohol; or in the form of extract made in the same proportions.

Bitter Almonds.—The aroma of the bitter almonds is due to one of the most violent poisons (hydrocyanic acid). It is extracted by different methods. The essence occurs in commerce. It should be used in infinitely small quantities.

Sassafras.—The wood and bark of sassafras, rasped or in shavings, come from the sassafras tree, which grows in America. They possess a sweet odor, and contain an essential oil, which is extracted by distillation, and which is also met with in the trade.

We have tried to use other aromas; but they are only useful as auxiliaries of the three first mentioned—iris, raspberry, and clove—because their odors differ considerably from the natural bouquet of mellow wines.

All these preparations only give to the wine a bouquet and an aroma which is peculiar to the substances used. They can never impart the real bouquet which characterizes our fine wines; it is impossible to imitate this bouquet, and one may only succeed in flattering the sense of smell. The artificial aromas are very volatile, and it is even not necessary to be a connoisseur in wines to recognize them. Nervous persons are even inconvenienced by them, particularly if the aroma is very strong.

When an artificial bouquet has been added to a wine, it will still retain its peculiar taste; the odor is changed; but taste the wine without smelling it and you will recognize its peculiar flavor. The artificial bouquets do not keep as well as the natural ones, and they even decrease gradually in strength. In the course of time they volatilize, contrary to the advertisements sometimes published by interested parties who sell them.

The trade journals abound with advertisements of persons who pretend to be wine experts, chemists, etc., and who manufacture bouquets bearing the pompous names: Flavor of Medoc, Bouquet of Bordeaux, of Pomard, Extract of Bordeaux, etc. All these products of charlatanry are advertised as imparting to the most common wines the true flavor of Medoc, as improving and strengthening the wines, etc.

In the wholesale and retail trade of France, irisated wines are rarely met with. It is true, some merchants and wine makers use the iris to improve their poor wines; but a poor wine will always remain a poor wine, because it has no flavor and strength, and because, notwithstanding the advertisements, the *flavor of Medoc* has given them no flavor; this is, by the way, very fortunate for the vineyardists of the Medoc; for nothing else would be left to them, but to burn their vineyards if it were possible to impart the flavor of the Medoc to wines of the poorest class.

Upon the whole, the use of artificial bouquets is a process of improvement which does not come up to the practice of blending with wines which possess a good deal of bouquet and flavor—among these latter certain old white wines occupy the first rank. Among the artificial aromas, the alcoholic infusion of raspberries is the one which modifies the taste of the wines in their first years most successfully.

CHAPTER VIII.

THE SOPHISTICATION OF WINES.

General observations. Means of detecting sophistications. Artificial coloring of wines.

What has not been written on “the adulteration of wines in the trade!” The wine merchants of the great consuming centers, particularly those of Paris, have been accused of the most culpable frauds, as for instance of manufacturing wine without grapes, fermenting solutions of sugar and tartaric acid and coloring these liquids by extracts of logwood. It has also been said that the harshness imparted to the mixtures by artificial coloring matter was neutralized by the addition of litharge.

These accusations seem false and exaggerated. The authors, who say those things without weighing their words, ought, before making such statements, to consult the official tasters of wines and the chemists—whose duty it is to analyse the seized wines—and the decisions of the Courts. They could also satisfy themselves by an experiment that such a mixture does not possess the taste of wine, and that they can thus form nothing but a disgusting beverage and a violent poison. It is besides an easy matter to detect such fraud, in that it is sufficient to pour a few drops of sulphuretted hydrogen-water into a wine which contains litharge in order to obtain a black precipitate, or at least to impart to the liquid a brownish color.

There are undoubtedly sold in Paris wines of very poor character and wines which are very weak. There may be found in the records of the Courts many judgments against merchants who were guilty of having sold wines which contained a greater or smaller admixture of water. It is seldom that the chemical analysis of the wines seized reveals in them unwholesome matters. There have been, however, effected seizures from the stock of ignorant merchants who had no idea of the composition and of the treatment of wines, and who had therefore used, to impart color to their wine, mixtures of alum or other substances; but, truly speaking, they did not know the properties of these substances.

On the whole, those having in charge the ordinary wines retailed by the great firms in Paris, know that no wholesome substance can ameliorate a wine, nor even conceal its defects. More than three fourths of the sentences for adulterations are based on the admixture of water to the wines.

We can positively state that in the viticultural centers of the Gironde and in the neighboring wine-producing countries, the wine producers and merchants are too much interested in finding the best possible means of producing good wines, to spoil them by sophistication with unwholesome substances, the use of which does not even conceal their defects. There are found, however, in certain places, wines with a very low percentage of alcohol, which possess a too *smooth* taste. These wines are often diluted by an admixture of very weak wines or "piquettes," sometimes of water; but this kind of adulteration is to be met with only among very common wines which are destined for the provincial retail trade. Producers of good brands know by experience that such dealings would close the markets for their wines, instead of bringing them a profit. This accounts for the fact that in the markets of Bordeaux and of the south of France, sophisticated or simply watered wines are so seldom met with; but notwithstanding this, we are going to point out the most practical methods of detecting these frauds. We must first state, however, that all these methods are of little use to the men who are themselves in the business, for by tasting, by distilling the wine in small stills, and particularly by comparing the samples with faultless typical wines, they can guess the nature of the fraud, though they cannot determine exactly the quantity of the admixture. The adulterated wines met with most frequently, particularly those which are found in countries where wines are rare and high priced, are: 1, wines which have been diluted with water; 2, artificially colored wines; 3, natural wines mixed with fermented liquids, which are made from sugar, glucose, brandy, cider, etc.

One must have a great deal of experience in tasting in order to be able to define exactly the kind of admixture. This is particularly difficult in cases where the quantity of the admixture is small, or when the sophisticated wine has been made a long time ago and since fined. In such a case the mixture has become more intimate and a good part of the insoluble matter precipitated.

DILUTED WINES.—It is possible to recognize a diluted wine on tasting, if one has an experienced palate. This kind of wine is thinner, and the more water added the less bitartrate of potash and other organic salts they contain in proportion. In Paris the tasters, who are commissioned by the police department to inspect the liquor trade, enjoy a

somewhat discretionary power, so far as the provisional seizure of wines is concerned. They have the right to seize every wine which they think is diluted with water, whatever its alcoholic strength may be; otherwise, many of the retailers would think it feasible to dilute wines which contain from 12 per cent to 14 per cent of alcohol, to an average strength of 9 per cent to $9\frac{1}{2}$ per cent, and would consider themselves safe from legal process, under the pretext that the wines of the central provinces of France do not contain much alcohol; but the administration justly punishes the fraud whenever it detects the presence of water, even if the alcoholic percentage of the diluted wine is higher than in the ordinary wines. A warning to the perpetrators of frauds!

It is possible to ascertain exactly the quantity of water with which a wine is diluted, by evaporating a portion of the same to dryness. In the residue will be found (together with the organic salts which each wine contains) the lime salts which were in the water that was added. If the chemical composition of the water is known, it is an easy thing to calculate, from the weight of the lime salts present, the quantity of the water of dilution. If the water was added recently the analysis gives positive results; but in case it has been added long ago, so that a portion of the salts has had time to be precipitated, the results of an analysis are less trustworthy. At any rate, it is a delicate operation, which can be done only by an experienced chemist. If the water which has been used does not contain any lime salts, but the same salts which are peculiar to the wine, the tasting and the chemical analysis can give but certain results.

There are certain countries, far distant from wine-growing centers, where much diluted wine is met with in the trade. Particularly in the colonies, a great many wines from the south of France are sold, which are diluted with water and artificially flavored. These wines are sold under the name of "*petit Bordeaux*" (little Bordeaux).

If distilled water has been used for the purposes of dilution, it is, unfortunately, very difficult to detect the fraud.

ARTIFICIAL COLORING OF WINES.—In the vineyards of southern France no artificial substances have been used for imparting color to the wines, because the "black" wines, *i. e.*, those which are deeply colored, abound. In certain regions of central France and of foreign countries, colored infusions are made use of. Such infusions are made from elderberries, etc., sometimes with water and sometimes with alcohol. The manufacturers add to these infusions a strong dose of alum in order to revive and to preserve the color, which otherwise would soon become insoluble. Such infusions or "lakes" become very unwholesome through this addition.

Besides fruit juices as coloring matters, there have been used extracts of beet roots, of litmus, of cochénille, of tincture of orchil in paste, of eudbear (coloring matter extracted from orchil), of the leaves of the red marsh-mallow—and besides a great number of blue vegetable colors which are turned red by tartaric acid: ammoniacal cochénille, specially prepared caramels, called "colorine of aniline," etc.

These various organic or mineral colors cannot preserve, in most instances, their red tint as long as the natural color from the skins of the grapes. In the wines, they are rapidly precipitated with the lees, and are always injurious to the frankness of the taste. Many of these

artificial colors require an addition of alum, and the result is that they become unwholesome. Sometimes foreign wines are met with, and imitations of sweet wines, which are colored with the help of ordinary caramel. This substance has the inconvenience of imparting to the wines a taste which is not very agreeable, and sets them to fermenting if they do not contain enough alcohol. Still it is not unwholesome.

On the whole, as we have already said, white wines which are artificially colored cannot become red wines if they lack in tannin; they neither possess the taste nor the composition of red wines, and a trained eye and palate recognize easily either their artificial color or their characteristic taste of white wine. Certain unwholesome colors, in the composition of which arsenic enters through fuchsine, do not differ in their tint from the new wines, and do not leave a bad taste on the palate; but they separate out very rapidly, and besides, it is very dangerous to use them.

M. Fauré, the able chemist, who has analyzed the principal wines of the Gironde, gives a simple and easy method of ascertaining the presence of artificial colors. According to this authority, it is only necessary to add a little tannin to the suspected wine, and to treat it with a big dose of gelatine. If the color of the wine is natural, this treatment will decrease its intensity, while organic colors which do not have their origin in the skins of the grapes, are not affected. Unfortunately, in the majority of cases, the sophisticators use the artificial colors as an auxiliary, in order to increase the natural color of the blends made from various wines; the addition of a small quantity of foreign matter is in such a case very hard to detect.

The considerable difference which exists in the values of ordinary white wines and of red wines with a fine color (sometimes the latter commands double the price of the former), keeps a great number of wine makers busy looking for artificial colors to change the white wines into red ones; and it can be said that this is the sophistication which is most commonly met with, particularly if the prices of the wine are high and the vintage was a poor one. The trade should be on the lookout, and not only refuse to handle the wine, the genuineness of whose color is suspected, but should also cause analyses to be made of all questionable samples. We have already given one method of testing. Mr. Schrader has also given, at a conference which took place in Bordeaux, in February, 1874, a process for the detection of artificially added colors in the wine. It is remarkable for its simplicity, and is based on the fact that most of the artificially added colors, instead of combining with the wine, mix only, more or less intimately with the same, and remain quasi suspended in the liquid; so that by changing the density of the latter very gradually, they separate out.

This is the way the experiment is conducted: A small flask is filled with the suspected wine and suspended as straight as possible by the neck with the help of a string, then it is slowly lowered into a great flat-bottomed glass three quarters full of water. Care should be taken not to shake the water; also, the height of the latter should cover the open neck of the flask. Owing to the fact that it is specifically lighter, the wine rises slowly to the surface, where it forms a distinct layer. If the red wine is pure, the water at the bottom of the glass remains colorless; if it is artificially colored, the color diffuses, on the contrary,

throughout the liquid, and the water at the bottom of the glass appears colored.

In order that the experiment should succeed perfectly, the density of the wine should be taken into account. Its specific gravity must be less than that of the water, as is generally the case with ordinary wines; but for sweet wines, which are heavier than water, this test cannot be applied in the same way. In this case it would be necessary to immerse the flask with the neck downwards to the bottom of the glass; the wine would sink to the bottom, and if the color were artificial, the diffusion of the same would take place from the bottom to the top.

Certain wines, which have a very deep natural color, give doubtful results, if they are very new, even though they may be pure. This is due to their specific gravity, which does not differ much, and sometimes not at all, from that of the water. More trustworthy results will be attained by clarifying and fortifying the samples of wines which are too young.

The different coloring matters which are introduced into the wine possess different tints, and may be recognized by various reagents. In the following is described the peculiarities of artificial coloring matters commonly used in our day:

Red Caramel, or Colorine.—This substance has the consistency of a thick syrup. Before adding to it the wine it may be dissolved either in water, white wine, or in alcohol. Its tint is not changed. The liquid may be neutral, as ordinary water, or strongly acid. The coloring power of this substance is very great; three pints of it are sufficient to impart a deep color to a barrel holding fifty gallons. The tint which is obtained by the use of this substance does not show, even to the best trained eye, any difference from the natural color of a fine new wine. It is a frank wine—red, wherein no violet tint predominates. So far as the taste is concerned this substance does not possess either that of the ordinary caramel or any other appreciable taste. The samples which came under my observation were sent from a manufactory in the department of the Seine-Inferieure.

The white wines which are colored with this substance show a peculiar behavior. They are tolerably clear, if the artificial color has not been introduced too long ago; but on being mixed with red wines of natural and light color, they become turbid, and by the process of fining a large portion of the color is precipitated. It can be easily recognized in the lees, which have a slimy appearance.

The chemical analysis of this substance has been made officially on the occasion of a lawsuit before the Court of Libourne. The case originated under the following circumstances: Several soldiers in the garrison of Libourne showed symptoms of an indisposition which puzzled the medical men. These latter investigated the reasons of this indisposition, and came to the conclusion that it was due to the partaking of an excess of unwholesome wine. Samples of wine were taken from the places the soldiers used to frequent, and it was found that the wine was colored artificially. Analysis demonstrated the presence of fuchsine and of arsenic in the substance. The retailer had bought these wines from a wholesale house which had used this substance believing it to be harmless, as advertised and commended by numerous medals which the manufacturer had obtained for the preparation at different exhibitions.

This substance has been investigated by several chemists—among them M. Carles, apothecary in Bordeaux, who characterizes it in the following terms:

“On calcination this coloring matter yields a little ashes, which are neutral, and consist almost exclusively of oxide of iron and sulphate of lime. The color of the preparation becomes yellow by the addition of alkalies (potash, ammonia), or of mineral acids (sulphuric, chlorhydric); it is not affected by perchloride of iron. Treatment with alkali, ether, and acetic acid, show it to be composed of caramel, glucose, and a salt of rosaniline.”

The rosaniline of commerce often contains arsenic, and it is therefore dangerous to use this substance.

It can be recognized by M. Fauré's method, which consists in discoloring the wine by treatment with a strong dose of gelatine.*

A sample of the suspected wine is well shaken with the same volume of gelatine solution, and then filtered; the pure wine loses its color almost entirely, and turns decidedly green on the addition of volatile alkali (ammonia). On the other side, the wine which is colored by the rosaniline caramel is not changed by alkali, but according to M. Carles it regains its color on addition of an excess of acetic acid (white vinegar).

Elderberries.—Since the last century dyes have been manufactured from elderberries; they have been particularly used to color champagne of a pale red color. The manufacturers add to these dyes alum, in order to make the color more stable; but there is not enough of it manufactured to bring it into common use among the makers of white wines. M. Carles makes use of the following method to recognize the presence of the extract of elderberries. He takes a white porcelain pot, or large coffee cup which holds half a pint of water; pours into the water thirty to seventy-five grains of the suspected wine, and stirs the mixture with a spoon. The wine which contains an admixture of the extract of elderberries, turns green after a few minutes, while the mixture of pure wine and water does not change its color. Likewise those which are colored by “colorine,” rosaniline, and cochenille. The wines which are colored with elderberries turn distinctly green on addition of volatile alkali; give, with acetate of lead solution, a pale red precipitate, and become blue on the addition of acetate of alumina. When the extract of elderberries does not contain alum, it is not unwholesome; but it imparts to the wine a strange taste, besides the color has too much of a violet tint, and is not durable.

Bilberries.—Their color is not a frank one; it is a red which can be recognized at the first glance, which has little intensity and not much brilliancy. It turns green on addition of acetate of alumina. Its presence may be recognized by the experiment we have mentioned in the beginning of this chapter.

Ammoniacal Solution of Cochineal.—The color which is obtained by the use of this substance is not frank; it is changed by tartaric, acetic, and other acids from violet to a brick-red. The orchil, the cudbear, and logwood extracts show the same peculiarities. These coloring matters dissolve in alcohol, and impart to it a violet tint, which changes into a

* M. Carles has obtained the same results by using albumen; he uses the half of the white of an egg well beaten with its own volume of water, on three ounces of wine which is to be treated.

frank red on the addition of a little sugar-caramel. In the wine, the presence of the organic acids changes this tint into brick-red in the case of the three first colors, and to yellow in the case of the latter. M. Carles pours ten to twenty drops of the wine which is thus colored into a porcelain dish holding half a pint of water. After a quarter of an hour the wine has assumed a violet tint, owing to the presence of the bicarbonate of lime in the water. In summarizing, we must say that wines which are colored with the above substances are not salable.

Aniline Red.—This color is somewhat related to the caramel we have spoken of, and contains always more or less arsenic; it is therefore unwholesome. This red has a very brilliant tint, and a mixture of the same with caramel from molasses is the most powerful coloring matter known. M. Falières, of Libourne, has invented a very sensitive method of detecting it: seventy-five to ninety grains of the suspected wine are introduced in a flask which holds a little less than two cubic inches; a small excess of volatile alkali is added, and the flask filled up with pure ether; after shaking the mixture well it is allowed to settle. The colorless base, *rosaniline*, dissolves in the supernatant ether. A portion of this ether is decanted into another flask, and some drops of acetic acid (white vinegar) are added. If the wine contains *rosaniline*, the ether will assume a pale red color. The reaction will be much more distinct if the ether is shaken with a few drops of water, which takes up all the color. This color shows the same behavior as the red caramel we have spoken of, and separates out of the wine in the same manner.

It is evident from all we have said that *none of these colors are stable*, and that a great number of them are unwholesome. The wines which are colored by these artificial means are in most instances the worst kind of white wines.

MIXTURES OF FERMENTED LIQUIDS.—It has been sometimes found that certain wines contain an admixture of cider; of liquids fermented from glucose syrups; of weak brandy, etc. These different mixtures can be easily recognized on tasting if they form a considerable part of the wine. The difference in the composition of the residues or of the extracts indicates to the chemist which of the foreign matters has been introduced.

All of these fraudulent processes are punished in France by the law as falsification of food.

Besides falsifications, giving a wine a false name and false origin constitutes an offense which is punished by the law, because, of whatever the quality the merchandise may be, there is an imposition practiced on the quality of the goods sold. The habit of the public in designating certain goods by the name of the country which produces the best quality, seems to excuse, in a measure, this giving of false names, but a merchant who possesses any self-respect would blush to designate ordinary wines by the names of those celebrated. They know that by cheating their customers they expose themselves to the danger of losing both reputation and trade.

CHAPTER IX.

COMMERCIAL ANALYSIS OF WINES.

Physical properties and commercial value of wines. General composition of wines; their chemical analysis, etc. The component parts of the wine considered separately. The physical analysis of wine. Analysis of sweet wines and cordials.

PHYSICAL PROPERTIES AND COMMERCIAL VALUE OF WINES.—The physical analysis of wine consists in the judgment of a connoisseur, corroborated by the use of scientific instruments. With the help of a trained palate it is possible to recognize by the looks, odor, and taste the different and slight gradations, qualities, color, flavor, bouquet, mellow or faulty taste, and likewise the defects of wines.

Fine wines of the highest quality can be appreciated only by the connoisseur. Qualities which are particularly appreciated by trained connoisseurs, and which in the aggregate make a perfect wine, cannot be measured and defined by chemical means. These qualities consist chiefly in the intimate combination of the elements which compose the wine, in the fineness of the bouquet, combined with a decided and sweet flavor, a mellow, velvety taste, and a brilliant color. Chemical analysis can give but a very poor idea of these qualities unless aided by tasting. This is so very true, that between the analysis which the most skillful chemist can make of our finest, but *young* red wines, and that of the ordinary wines from the south, which have gone successfully through vinification, and which have the same alcohol-percentage, there would exist but apparently unimportant differences, while in reality the value of the first wine may be twenty times greater than that of the other.

GENERAL COMPOSITION OF WINES, THEIR CHEMICAL ANALYSIS, ETC.—The complete chemical analysis of a substance consists, as is known, in isolating the principles or elements which compose it; in a word, to decompose it. A great number of chemists have devoted their attention to the more or less complete analysis of wines of all kinds. Chemists and observers agree that all natural wines contain about the same elements. The analysis of a good, ordinary wine can be summarized thus: it contains per liter, alcohol, 10 per cent; water, 90 per cent; extract, about 20 grammes. In this extract are contained the coloring matters, the organic salts, of which the principal is the tartar (bitartrate of potash), which alone represents a weight of from five to six grammes; mineral salts, acids (tannic, acetic, carbonic, tartaric, etc.); traces of ethers, aldehyde, essential oils; mucilages, pectine, and ferments. These substances are met with in various wines. The exact knowledge of the combinations formed in wines, and which impart to them their various flavors and bouquets, is still very imperfect. It is possible or has been thought possible to analyze more or less completely these component parts, but their synthesis has not been effected up to the present day.

The analysis of wines cannot be carried on in the same systematic manner as that of inorganic matters. Those who have devoted themselves to oenology know, that from the moment fermentation has transformed the must into wine, and until it begins to decompose, continuous changes go on in its taste, color, flavor, bouquet, and general composition.

On tasting a well made wine which is several years old, it is possible to recognize that certain substances which it contained originally have vanished; but as a result, compound substances which did not exist before have been formed; they impart to the wine a flavor and bouquet which are entirely different from those it had on leaving the fermenting tank. A portion of the organic and mineral salts, ferments, organic albumen, coloring and mucilaginous matters, various acids, tannin, etc., have been eliminated, either owing to the natural clearing, or to treatment with finings, or to racking. These slow but progressive, and, so to speak, daily changes, make a regular analysis impossible, because a majority of the substances which compose the wine are liable to become precipitated and form compound bodies, or to become insoluble. The alcohol combines with the acids, forming ethers, which produce the bouquet that did not exist before. On account of these constant changes it is impossible to define precisely the composition of a wine, and even in the most complete analyses there are many things which escape the notice of even the most attentive analyst.

It is also known that the composition of the same brand varies with each vintage, according to the degree of maturity, the stock and age of the vines, the duration and processes of vinification, the various methods of treatment, etc.

THE COMPONENT PARTS OF WINE.—From the commercial standpoint, the object of vinification should be to obtain wines which contain a sufficient quantity of preserving elements to fit it for good keeping and proper aging. The chief preservative elements of the wine are alcohol and tannin.

Alcohol.—The general properties of alcohol are well known—it imparts to the wine strength, heating, and intoxicating qualities. The maximum of alcohol which a wine can attain by the fermentation of rich musts is between 15 and 16 per cent. If the percentage is a higher one it is *due to the artificial addition of alcohol*. In proportion as the wine ages a portion of the alcohol evaporates, or it may become oxidized, and form acetic acid if too much exposed to the air. But when the wine is too old, when it degenerates, the alcohol undergoes a total decomposition without coming in contact with the air. This alteration has been particularly noticed in bottled wines.

Tannin.—Tannin or tannic acid is, after the alcohol, the most useful element in the preservation of wines, in the union of their component parts, in the maintenance of the coloring matters found in solution. It eliminates the ferments by forming with them insoluble compounds; it promotes the clearing of wines by combining with the finings and particularly with pure gelatine. Tannin is a substance of astringent, harsh taste, which is met with in several plants and which occurs in various forms—according to its origin. It is found in large quantities in the stones, skins, and stems of the grape, in the bark of the oak, in the gall-nut, quinine, caoutchouc, and in many other substances.

This substance is frequently used in medicine and the arts. As medicine, the tannin from gall-nuts is most frequently used. In trade two varieties of tannin are met with, whose difference is produced by the method of extraction employed. Gall-nut tannin extracted by ether is purer, but often retains an ethereal odor and taste. Tannin extracted

by alcohol has no odor and should be preferred for the treatment of wines.

As it is sometimes difficult to obtain this substance in places distant from large cities, it is possible to introduce a large quantity of tannin into ordinary white wines by using the tannin which is contained in the grapes. This tannin can be obtained by extraction with boiling water. For this purpose we use seeds which have not yet undergone fermentation. For this purpose they are roughly crushed and boiled in a kettle for several hours. Afterwards the water should be decanted, and if not immediately required for use, should be fortified with alcohol up to 17 degrees. The liquid should be filtered and will then keep very well. If it is desired to increase the tannin in ordinary white wines, about forty pounds of crushed raisin seeds are introduced into a barrel of clear wine, which should be at least one year old; after two months draw off the wine.

In case it be found impossible to obtain grape seeds, oak bark can be used; either digest it in the cold with white wine or infuse with hot water. Oak bark has a rather strong woody taste. When possible, it is more advisable to use grape seed, which imparts to the wine a natural astringency. It is possible by studying varieties to increase in a natural way the quantity of tannin without using artificial means, and that is in all respects the best plan.

Among the varieties which are grown in the Gironde, there is particularly one which contains in its seeds and skins a considerable quantity of tannin. This is the *Verdot* (particularly the *Petit Verdot*). Wine makers who produce mellow wines, difficult to preserve and export, may improve brands by introducing into their vineyards a certain quantity of this excellent variety; particularly if they have spots well exposed to the south, for this variety matures rather late.

The barrels have also a great influence on the quantity of tannin which a wine contains. For those poor in this substance, new barrels from Bosnia oak should be selected, and rinsed simply with cold water. Barrels which are made from American woods, or which have already done service, should never be used in this case.

The fermentation of mellow wines should not be conducted in the same manner as that of the wines which we wish to become rich in tannin. In the latter case the grapes in the fermenting tank should be completely crushed, the stems should not be removed, and they should be kept immersed in the must during the whole period of fermentation, which should be attentively watched in order to draw off the must as soon as it is over. The supply of tannin may be recognized as inadequate if gelatine remains suspended in the liquid. White wines which have undergone fermentation in old barrels are generally those most lacking in tannin. Red wines generally contain enough tannin, owing to their long contact with the pomace in the fermenting tank, particularly if *new barrels made from oak* have been used. In wines of high quality, which are destined for bottling, an excess of tannin would impart too much harshness; this inconvenience can be avoided by stemming the berries completely before fermenting; avoid, too, as much as possible, their crushing, and draw off the must as soon as the first violent fermentation is over. If a wine contains too much tannin it has a harsh and rough taste during the first years; but after awhile this substance becomes precipitated, perhaps by forming insoluble

compounds, or even becoming transformed, as is generally suspected, into gallic acid. It is easy to precipitate a large portion of the tannin from wines which are too harsh, and which are destined to be used immediately. But this should never be done with wines destined for a sea voyage, or which are light colored, because, though the removal of the tannin helps to age them, it has, also, the disadvantage of discoloring them.

Free or Combined Acids.—The taste, the flavor, and the bouquet of wines can be modified by the free acids, the essential oils, the ethers, and by the various compounds which they contain, or which are being formed. The free acids which have the greatest influence on the taste are tartaric, malic, and several other higher acids, which are formed before the wine reaches its maturity, as well as acetic and carbonic acids. The two first mentioned acids are found particularly abundant in the imperfectly ripe grapes, and they impart to the wine a taste of harsh tartness.

Acetic acid develops chiefly in wines whose vinification has been faulty and neglected.

Carbonic acid is found in new wines which undergo an after-fermentation. This acid, which imparts to the sparkling wines the property of foaming, should be removed from mellow wines which are intended to be aged under proper conditions.

Flavor and Bouquet.—Flavor differs materially from bouquet. The flavor is an aromatic taste which may be agreeable or disagreeable, and which is judged by the palate. Bouquet, or aroma, is an odor, and can be appreciated only by the sense of smell. The flavor of each kind of wine, which is the characteristic taste, is appreciated when the liquid is introduced into the mouth, just as any other kind of dish is tasted. The non-odoriferous substances are those which contribute to the formation of the flavor. This is the reason why a wine may have a flavor and a sharply defined taste, but no bouquet.

The cause and origin of flavor is due to the particular taste of the different grape varieties in conjunction with the modifications which may be produced by the nature of the soil, by the site of the vineyard, methods of vinification and of conservation.

There is not much known of the formation of the bouquet. Certain œnologists believe it to be due to the essential oils which are chiefly contained in the skins of the grapes, and which, it is alleged, are dissolved during the process of fermentation. We do not exactly share in this opinion. We do not say that the skins do not contribute to the modification of the aroma, and consequently of the bouquet; but we do not admit that the bouquet has its seat in the skins, like some of the essential oils in the skins of certain fruit. That being the case, the wine would have a bouquet on leaving the fermenting tank; but it is known that this quality is acquired only after several years.

White wines which ferment in casks without coming in contact with the skins and seeds, ought, according to this theory, be deprived of aroma; but experience has proved that these wines do acquire a flavor and a bouquet, more or less developed according to the variety of grapes employed. It can hardly be said that Sauterne, Yquem, and certain other white wines, are deprived of this quality. It is even possible to find white wines which are possessed of it even in a higher degree.

We believe that the bouquet which (we find it here necessary to

remark) develops only after the lapse of several years, is of a very complex nature, and is formed from substances which exist chiefly in the must, but which produce an aroma only after entering into certain combinations. These combinations are chiefly formed of alcohols and acids, and result in ethers or essential oils. The latter becomes more perceptible to the sense of smell after a considerable portion of the lees has separated out. It is our opinion that the skins contribute to the modification of the flavor rather than of the bouquet. The flavor and bouquet can be modified and improved by an intelligent selection of varieties which give the finest and most aromatic grapes, by selecting favorable sites, and such manures which do not increase the taste of the soil by their putrid odor.

As far as artificial means of imparting bouquet are concerned, we refer the reader to the chapter on *Blending*, where we emphasized that in this way only poor results are obtained.

Organic and Mineral Salts.—The organic and mineral salts which wines contain are numerous; but, with the exception of tartar (bitartrate of potash), they have not much influence on the taste. Tartar is that salt which is found in the greatest quantity in all wines. It is known that this salt separates gradually from the wine, and becomes precipitated with the lees, or adheres (mixed with coloring matters) to the walls of the barrels. New wines contain, on the average, five grammes per liter; but this quantity decreases with time. Tartar imparts to the wines a slightly acid taste, particularly if it is contained in abundance. It possesses the property of giving increased activity to fermentation, and of dissolving the ferments. It becomes, thus, very useful in the process of vinification. The other organic and mineral salts are also precipitated to a great extent with the lees. Thus it happens that all old wines contain much less salts than new wines.

Mellow, Oily, Velvety Taste of High-Class Wines.—The fine red wines of the Medoc and of other vineyards of the Gironde, as well as the fine Burgundy wines, retain, on aging, a decidedly fruity flavor, an oily consistence, and a mellow, velvety taste, which together with their peculiar flavor and bouquet, are the delight of connoisseurs. This mellow, velvety taste is produced only in those years when the grapes had a chance to become perfectly ripe. In bad years, when the grapes do not attain their perfect maturity, the wines may acquire more or less flavor and even some bouquet, but they are dry and lack mellowness. Many ordinary wines which have gone through the process of vinification in the proper way and date from a good vintage, possess as long as they are young, a decidedly fruity taste; but in most of their kind, this mellow taste does not keep, but vanishes gradually with time. In high-class wines, however, which date from good years, the mellow and oily taste is more prominent after the lees has settled than when they are young. We believe the substance which imparts this mellow and oily character to the wines is produced by a modification of the grape-sugar. This opinion is strengthened by the fact that mellow wines which are stored in cellars with irregular temperature, undergo in the end an imperceptible fermentation, particularly if they are in their first or second year and if they still contain some ferments. Very often—after such an imperceptible fermentation—the oily consistence disappears and the wines become dry. This fact makes us believe that under the influence of ferments and variations of temperature this substance undergoes the same transformations as the sugars.

PHYSICAL ANALYSIS OF WINE.—The main object of the physical analysis is to affirm the facts which have been ascertained by tasting. An expert can determine the alcohol-percentage of a wine by the use of his palate alone, even to within a fraction of a per cent.

Alcohol.—The alcoholic strength of a wine can be recognized by distillation. If this operation is carried on with care, the results are very exact. The distilling apparatus of Salleron is at present universally used. The distillation can be performed with less than sixty cubic centimeters of wine. In order to make use of this apparatus the wine to be distilled is poured into a small measuring cylinder, filling it up to a certain mark. Then this quantity is poured into a small retort, and the distillation started. The distillate is collected in the same measuring cylinder. When the latter is half filled up to a mark which is scratched in the glass for this purpose, the distillation is stopped, and the cylinder filled with distilled water up to the first mark to which the wine stood originally. The liquid is now well shaken, and a thermometer and an alcoholimeter are introduced into the same. After a few minutes both instruments are read, and the alcohol-percentage calculated from a table, which is specially prepared for this purpose.

Intensity of Color.—It is very easy to get at the intensity of color by comparing it with other wines, if one has a trained eye, and particularly if the examination is performed in a bell-mouthed silver cup.

If the samples are in a turbid condition, it is difficult to judge them. To get an exact idea of their color they should be fined with a very small quantity of albumen (white of egg) and well shaken for a minute. If there is reason to believe that albumen would not produce the desired effect, a small quantity of gelatine dissolved in a few drops of warm water, to which is added a pinch of tannin, should be used. After this the wine becomes clear in a day or so, and it is then much easier to estimate the intensity of its color. Should there exist some doubt concerning the origin of the color, the test should be applied which we have mentioned in the chapter on *Sophistications*.

Presence of Tannin.—Before exporting a wine it should be ascertained if it is fit to undergo the trials of a long voyage without spoiling, and if its color is stable and does not become precipitated too easily. If the wine originally contained the proper quantity of tannin, the color keeps better during a sea voyage. In order to ascertain if this is the case, either a barrel should be fined with double the usual amount (two tablets) of gelatine, or a bottle with the same quantity of gelatine in proportion; and after clearing, the difference in color will appear. If the gelatine has been precipitated, and if the wine is in a bright condition, it is a sign that it is well supplied with tannin. Should it not contain a sufficient quantity of tannin, the gelatine will remain in suspension. The trial may be completed by exposing a bottle filled up to the cork to a temperature of 120 to 200 degrees for one week, or, if it is summer, expose it to the sun's rays. Wines which withstand such a trial can be shipped without fear.

Saccharine Matters.—In order to ascertain how much sugar sweet wines contain, a very simple operation has to be done. A certain quantity is measured in a graduated cylinder, poured into a dish and evaporated—either on the free flame or on the water bath—to half of its bulk. This extract is now poured again into the cylinder, and the latter filled with water up to the mark indicated by the wine originally; the

contents should be well shaken and the specific gravity ascertained by means of a saccharometer. Before using this instrument, the liquid should have cooled down. It is even advisable to let it stand for twenty-four hours, in order to allow it to separate from the tartar and the organic and mineral salts, which could possibly exercise an influence on the instrument. If a distilling apparatus is at hand the operation is still simpler. First the wine is distilled, and its alcohol-percentage ascertained by distilling off half of the wine; the other half, which remains in the retort, is poured back into the graduated cylinder, and this is filled with distilled water up to the mark which the wine had reached originally; after shaking well the saccharometer is used.

By calculating the sugar from the reading of the saccharometer, the salts which the wines contain are not taken into account. In some varieties these salts increase the reading of the saccharometer by a whole degree. Care should be therefore taken, if full-bodied and young wines are under examination, to deduct one degree from the reading. For purely commercial purposes there will be obtained in this way more correct data, particularly if the liquid has not been allowed to stand for twenty-four hours, and to get rid of the salts by crystallization.

ANALYSES OF SWEET WINES AND CORDIALS.—The cordials are composed of alcohol, sugar, and flavor. The extra fine cordials are more valued, for their better flavors are combined. Their aromas are sweeter, and they are older, thus they acquire a mellow taste, which is the result of the intimate combination of their aroma and their alcohol with sugar. This combination can be effected only with time; for, indeed, so long as they are new they always possess—regardless of the care exercised in their manufacture—a little harshness and roughness, which is due to the superabundance of aromatic substances, and also to an empyreumatic taste, resulting from recent distillation. The excellence of the taste of extra fine cordials can be appreciated only by tasting. Aside from the taste, it is necessary to ascertain the quantity of alcohol and sugar which they contain, in order to determine their commercial value, and in order to know, in case they are destined for export, if they contain enough alcohol to stand the trials of a voyage.

Alcohol.—The quantity of alcohol which these sweet liquids contain can be ascertained by distilling them in the same manner as described for ordinary wines. The Salleron apparatus can be used for this purpose.

Sugar.—The sugar in the sweet wines can be determined in the same manner as prescribed for ordinary wines.

CHAPTER X.

EXPERIMENTS ON ARTIFICIAL AGING.

The different methods in use; their effect on mellow and sweet wines. Fining. Continuous agitation. Exposure to the sun in closed vessels (wooden or glass). Application of heat (pasteurizing); its influence in the conservation of wines of the Gironde.

Wine attains the full development of its qualities only after a certain lapse of time. On leaving the fermenting tub it is far from showing the aroma, color, and flavor which it acquires after a few years, or, perhaps, even after a few months only.

The degree of perfection which a wine can attain is determined by the relative proportions of the different substances which compose the same. Certain wines, which are very poor in preserving substances (alcohol and tannin), begin to decompose immediately after fermentation. These wines, the value of which is not at all increased by time, should be consumed *as soon as the after-fermentation is over*. It is useless to age them. Other wines, which contain a sufficient quantity of these substances, require several years for their complete development.

In general, the bouquet and flavor of wines develop perfectly only when they have cleared perfectly—that means, when they fail to deposit any more insoluble matters, such as mineral or organic salts, ferments, and coloring matters, by remaining undisturbed for several months.

The old wines differ, as is well known, from the new ones of the same character by their color, their aroma, and by their flavor. These differences are due to various reasons:

The *color* is pale in an old wine on account of the coloring matter having partly separated out. This is due to the formation of several insoluble compounds which are carried down with the lees.

The *aroma* of the old wines is more fragrant, because *ethers* have formed through the combination of alcohol with the acids which are contained in the wine, and because the odor of the aromatic substances is no longer covered by the carbonic acid, which was liberated after the first fermentation of the young wine was over.

The difference in the flavor is due to several reasons, such as to the separating out of a large quantity of mineral or organic salts, which have been carried down with the lees, and which have become insoluble by their combination with the tartaric, acetic, and malic acids. This difference is *also* due to the precipitation of a part of the color.

All these facts tend to show that the wine, on getting older—providing it has been properly treated—contains less coloring matters (organic and mineral salts, free or combined acids, tannin, ferments, mucilaginous substances, alcohol) than it did shortly after fermentation. This result is obtained with the aid of time and labor judiciously applied. Several operations hasten the aging of wines: (1) Repeated treatments with finings; (2) Continuous agitation; (3) Exposure to the sun; (4) Application of heat. We are going to examine one after another the various changes which these processes cause the wine to undergo, varying with the composition of the latter.

AGING BY MEANS OF TREATMENT WITH FININGS.—We have already shown the action of the various finings upon wines of different character, and the changes thus produced according to the chemical or mechanical influences which they experience. We have also shown the disadvantages which result from repeated finings. Indeed, the clarifying substances which act most energetically—such as pure gelatine—on account of their being coagulated and precipitated chiefly by tannin, carry down with the latter into the lees a part of the coloring matter, which is intimately associated with the tannin. The result of such a forced treatment with the finings is that the wine becomes poor in color and in tannin and that thus a part of its chief preserving element is removed. Another result is that a certain quantity of mucilaginous substances is also precipitated, and these latter, as is well known, give the fruity taste and the oiliness to the wine. The wine has been thus

certainly aged, but it has not preserved its mellowness like wines which age naturally; on the contrary, it becomes harsh and dry.

Repeated and energetic treatments with finings should be applied only to very harsh and deeply colored wines or in cases when there is no time to wait for the transformation of the tannin into gallic acid.

AGING BY CONTINUOUS AGITATION.—The pitching and rolling of ships impart to the wines which make a sea voyage a continuous movement. This movement is augmented by allowing the casks to go imperfectly filled. During long sea voyages this prolonged movement modifies the character of the wine either in a good or in a bad sense. It renders insoluble a part of the coloring matter, precipitates or brings into suspension a part of the organic and mineral salts, and changes a part of the tannin into gallic acid; ethers are formed, and the wines become more or less turbid. Should the wine be rich in color, tannin, and alcohol, it will improve in quality; it will age much quicker than the wines of the same character which remain in the cellar. Should it be, on the contrary, poor in preserving materials—tannin and alcohol—it will arrive very turbid and ready to undergo the putrid fermentation. The expansion and the contraction which are caused by the variations of temperature which occur in the hold of a ship during a voyage through extreme latitudes, increase the precipitation of insoluble matters, the solution of salts, etc. *The movement alone, will do the same*, even if the temperature remains uniform. We were able to ascertain this fact by the following: While visiting the vineyards of the south, in 1854, a proprietor in the neighborhood of Castel-Sarrasin gave us his wines of the vintage of 1853 to taste. These wines were kept in small tuns of equal size, were all of the same kind, dating from a poor vintage, and were made from grapes which had grown on young vines belonging to an ordinary variety; they were very poor in alcohol, color, and tannin (they contained 8 per cent of alcohol). Their color, though not deep, was still brilliant enough, but the wine in two of these tuns showed a dull, leady color; they were also turbid, and possessed a slightly putrid odor. And still it was the same wine as in the other tuns; but these two tuns had been filled by means of a suction and forcing pump, and this operation had made them turbid, and had started in them, owing to their deficiency in alcohol and tannin, a complete decomposition by precipitating a part of their color. On the contrary, the wines which had not been fretted remained bright. Numerous and practical experiences tend to confirm the theory—that the aging by means of agitation and sea voyages is unfavorable to the weak wines which lack in preserving elements, while it favors the development of wines which are *rich in tannin and alcohol*. In order to obtain good results, the wines which are destined to make a voyage for aging purposes should first be thoroughly cleared by the application of finings and by racking. The barrels should be strong and iron hooped, and should not be completely filled—this in order to facilitate the motion of the liquid. For the same reason bottled wines similarly shipped should not be filled up to the cork. After the voyage the wine should be allowed to rest. If it has made the voyage in barrels, it should first be slightly fined; if it was bottled, it should be decanted, in most instances. If it is desired that the voyage should not age the wine, precautions of an opposite kind have to be taken—the barrels and bottles should be accurately filled.

We have compared the wines of Cos-Destournel 1848. of Saint Trelody and of Quinsac of the same year which were bottled and shipped in 1851 on board of a vessel bound for Calcutta, with the same wines which had remained in the cellar. In 1852 the bottles which had made the voyage came back; considerable sediments had formed in them, particularly in the Quinsac. They were placed again in the cellar. A month later they were tested (without having been previously decanted), in order to compare them with the wines which had remained in France. The differences in the color, in the aroma, and in the flavor were very great. Those which had made the voyage had acquired a brick-red color; their bouquet was much more developed, and they had more aroma. The wines which had remained in the cellar preserved their brilliant red color; were more fruity, mellow, and oily, and appeared consequently less old than the former.

AGING BY EXPOSURE TO THE SUNLIGHT.—This method of aging was known to the ancients. Galienus, a celebrated Greek physician, and a contemporary of Marcus Aurelius, relates that in his time (in the year 180 of our era) the Romans used to age certain wines by exposing them to the sunlight on the roofs of their dwellings. The reason that this method of aging is so little used now, is due to the fact that it cannot be applied successfully to every kind of wine; particularly wines which contain less than 15 per cent of alcohol. These are little fit to undergo such a treatment. We are going to explain under what circumstances and on what kinds of wine this method can be used with advantage. We must, first of all, state that the direct action of the sun's rays on bottled wines precipitates their coloring matter rapidly, and that this action is more marked on partially filled than on completely filled bottles.

Bottled wines which are wrapped up in paper, or wines in wood, age much slower under the same conditions. We were able to confirm the truth of this statement in 1854, when we received from Spain a sample box of red wines of the vintage of 1853; there were two samples of each type. After having tasted them, and ascertained how much alcohol they contained, the bottles were corked again and placed vertically on a shelf near a garret window, fully exposed to the sun. It was in the end of the month of May. The other bottles which had not been opened, and which were wrapped in paper, were placed horizontally on the same shelf. The wines possessed a deep color, and had on the average 15 per cent of alcohol; they had a rather sweetish taste. Three months later came the consignment of wine, the sample of which we had selected; we were very much astonished to find in the remainder of the bottle which we had tasted a straw-colored wine, by no means deteriorated, but possessing a very marked taste of "rancio." The wine in the bottles which had remained full, and were wrapped in paper, had retained its red color and peculiar taste, but nevertheless appeared older and less colored than the portion which had been in the cask.

It is evident that this result can be attributed to the joint action of the sunlight and of the oxygen of the air which was contained in the bottle that had been opened.

These Spanish wines, which showed high alcohol-percentage, and which still contained some sugar, had, therefore, improved on being exposed to the sunlight in partially filled bottles.

If this process is applied to the wines of the Gironde, or similar wines, they are spoiled instead of being improved. The following experiments prove this:

November 16, 1866, we placed on the roof of a cellar in Bordeaux, well sheltered from rain and wind, but exposed to the sun, four bottles of white glass which were only half filled with wine, stoppered with large corks of the best quality. These samples remained on the roof until the eighteenth of February; they had, therefore, the best opportunity to undergo changes of temperature ranging from 32 degrees to 77 degrees. In the following are given the results of their tasting, and of their comparison with the wines which had remained in the cellar:

No. 1. Wine of 1865; had a frank taste, ordinary color; alcohol, 10 per cent. The same after insolation in well corked and half-full bottles, flattish, moldy; slightly altered taste of an old wine; color, paler; considerable sediment.

No. 2. Wine of Sainte-Eulalie d'Ambere's, 1865; very fine color, excellent taste, decidedly mellow; alcohol, 10 per cent. The same after insolation, acid; considerable sediment.

No. 3. First crop Bassen, 1865; brilliant color, fruity taste; alcohol, 10 per cent. The same after insolation, flattish and acid; voluminous sediment.

No. 4. Wine of Banjuls, 1863; red, sweet wine; frank taste; alcoholic strength, 17 per cent. The same after insolation, decided taste of "rancio;" brick-red color; considerable sediment; frank taste. *The taste appears to be finer, more aromatic, and older than that of the wine which had remained in the cask; it also has less sugar than the latter.*

These experiments show that insolation can be employed with advantage only in the case of wines which contain more than 15 per cent of alcohol, also of sweet wines and of white wines which are fortified up to 18 per cent of alcohol, and which are destined for the production of wines after the fashion of Madeira; but wines with about 10 per cent of alcohol cannot be treated by this method of aging without being damaged more or less, on account of the oxidation of a part of their alcohol to *acetic acid*.

AGING BY THE APPLICATION OF HEAT.—Heat has been applied in different ways and in different degrees to the aging of wines. It produces more or less important changes in their composition, either improving or deteriorating them: First, according to the wines submitted to its action, whether in presence of the air, or in closed vessels, and depending how full the vessels are; second, according to the degree of heat to which the wine is exposed; third, according to the time the wine is heated; fourth, according to the composition of the liquid, and to the percentage of alcohol contained.

The first experiments, on heating wines, are lost in the mist of antiquity. Galienus, whom we have already mentioned, relates that in his time the Romans used to heat the wine in stoves. The Cypriotes, the Greeks, the Italians, the inhabitants of Madeira, and the Spaniards, age their wines in places which have a very high temperature. Modern authors mention several methods of heating; but they do not specify the wines to which the application of heat is advantageous or injurious; and yet this is the essential part of the question.

Numerous experiments enable us to affirm that heating, if it goes

higher than 86 degrees, is injurious to the fine and *mellow* wines of the Gironde, and to any wines with a delicate bouquet which do not have more than 12 per cent alcohol. This is true, regardless of the manner in which the heat is applied.

The fine wines which have, at the same time, an aromatic flavor and bouquet, a fruity taste, and are decidedly mellow, get, through heating, a certain taste of "rancio;" but at the same time they become dry, lose their mellowness, their freshness, and contract a "cooked" taste, which changes their character and makes them resemble the wines from the south of France.

Conditions of Exposure to Heat.—Wines which are exposed to the action of heat in direct contact with the air, lose a part of their alcohol by evaporation; the oxygen of the air makes them lose a part of their color, and, if the contact with the air is a prolonged one, they become weaker and undergo a radical change. If exposed to the heat in closed vessels which are not quite full, they lose a part of their color; and if they contain more than 16 per cent of alcohol, they contract a taste of "rancio." But if they are low in alcohol, and remain long under these conditions, the oxygen transforms a part of their alcohol into vinegar. In well filled and closed vessels, they do not undergo many changes, particularly if the heating does not last long, and does not go beyond 158 degrees; a small part of the coloring matter is always precipitated, however, and the taste is perceptibly changed. No matter how rapidly the heating has been done, the wine will always acquire a "cooked" taste and a slight odor of lees.

Influence of the Degree of Heat.—Whatever the wine may be which undergoes this treatment we should avoid applying too much heat, because there is danger that some of the substances which are in solution may be either precipitated or disassociated, and that thus the natural taste of the wine may be changed. In order to obtain good results we may adopt the extreme limits of 113 degrees and 158 degrees.

Influence of the Duration of the Heat.—The higher the temperature to which the wine is raised, the shorter the heating period should be.

Influence of the Character of the Wines.—Wines which improve most on heating are the sweet wines with a high percentage of alcohol. In order that they should not suffer changes on being heated they should contain at least 18 per cent of alcohol. As the alcohol gradually evaporates during the heating of the wines, its alcoholic strength should be ascertained from time to time and enough alcohol should be added afterwards to make up for that which has evaporated.

Preservation of Wines by Heating.—The learned chemist, Pasteur, once communicated a memoir on acetic fermentation to the academy, and published in 1866 an investigation, "Studies on Wine," in which he describes a process of preserving the wines by the application of heat. One of his processes consists in submitting the wines in loosely corked bottles to a temperature of 122 degrees to 152 degrees for a few minutes. Let them cool, cork and store them as usual. According to this honorable chemist the changes which the wines undergo are chiefly due to microscopic organisms; the germs of these organisms exist in all fermenting liquids, and a temperature of 131 degrees to 152 degrees is sufficient to kill them. Wines which have undergone such a treatment can be exposed to the air, according to the same authority, without being liable to the great changes they would suffer previous to such treatment.

Pasteur's communication gave rise to many discussions among the wine experts. It is said that the application of heat for purposes of aging wines has been known since long ago, and that it has been made use of in Cette to age the wines artificially. Indeed, several houses in Cette have used this method, but have at present partially given it up. The following contains the details of the method used by the Cette wine makers. The new wines were transferred into tubs which contain a worm in connection with a boiler. With the help of steam the temperature of the tub was raised to 77—86 degrees, and so continued for one week. The next week the temperature was raised to about 104 degrees, and was gradually increased so that at the end of three weeks 158—167 degrees were reached. The wine then became brick-red in color; it was allowed to cool and blended with other wines, because it usually acquired a bad taste. The application of heat hastens the aging of wine but makes it lose its oily consistence, and the precipitation of the coloring matter imparts to it a common taste of the lees.

Pasteur explained that by the use of his method he did not pretend to age the wines, but only to preserve them.

As far as we are concerned we do not advise the application of heat in preserving or aging wines of high quality of the Gironde. According to our opinion the quality most important to preserve in our wines is their mellow taste. The germs liable to rise and destroy the mellow taste and oily consistence of the wines by producing an after-fermentation may be more easily separated from the wine if it is allowed to rest at a low and uniform temperature, and the racking be judiciously applied, than if heat is brought into play. Care should be taken to use sulphured casks, and to avoid the free access of air. It should be further remembered that the wines of the Gironde which are made from good varieties and with the necessary precautions are not liable to undergo any injurious changes; they keep and improve better if the usual methods are employed, than if artificial means are used to hasten their aging and clearing.

EXPERIMENTS ON PASTEURIZING WINES.—In the following are recorded the results of pasteurizing various wines in a cellar in Bordeaux, November 16, 1886:

The wine was transferred into Bordeaux bottles, corked, wired, and afterwards put into a basket, with an upright set of eight pigeon-holes for the bottles. This basket was placed in a boiler whose bottom was covered with straw. Among the bottles there was one which was filled with distilled water, and which contained a thermometer. This bottle was corked in the same way as those which contained the wine. The boiler was then filled with water up to the neck of the bottles. The basket was taken out only when the temperature of the water had reached 125.6 degrees, after a slow and gradual heating.

The wines submitted to this experiment were the following:

No. 1. Wine possessing a frank taste; rather dry; color ordinary; perfectly transparent; 10.4 per cent of alcohol.

No. 2. Wine of very frank taste; decidedly mellow; fine color; alcohol, 10 per cent.

No. 3. Wine with brilliant color; fruity taste; aromatic; alcohol, 10.2 per cent.

After the pasteurizing, a bottle of each number was placed in a cellar

which had a constant temperature. At the same time a bottle of each kind of wine which had not been pasteurized was placed in the same cellar. In order to recognize the influence of the pasteurizing on the keeping qualities of the wine in contact with the air, the contents of each heated bottle were divided into two parts; one half was placed in a garret in an open bottle, which was only lightly covered, the other half in a hermetically sealed bottle. Together with these bottles was placed one bottle of the wine that had not been pasteurized.

Each number represented five different subdivisions:

- (a) A sample of the wine bottled and stored in the ordinary way.
- (b) A sample of the pasteurized wine bottled and stored in the cellar, under the same conditions.
- (c) Sample of the wine exposed to the air in a bottle only partially filled.
- (d) Sample of the pasteurized wine exposed to the air in a bottle only partially filled.
- (e) Sample of the pasteurized wine in a bottle only partially filled and hermetically sealed.

In order to control accurately the results of these experiments the wines remained in the cellar, or were thus exposed, from November 16, 1866, to February 18, 1867. Now, before judging ourselves, we decided to have them tasted by two cellar foremen of Bordeaux, expert tasters.

The wines were given to them in the following order, without telling them which were the pasteurized wines or those which had been exposed to the air.

No. 1. Pasteurized wine exposed to the air in a partially filled bottle.

Wine (not pasteurized) exposed to the air under the same conditions.

Pasteurized wine in a corked bottle, half full, and placed horizontally.

Pasteurized wine kept in cellar, in full bottles, placed horizontally, and well corked.

Wine (not pasteurized) kept in cellar, in full bottles, horizontally placed.

The tasters find that the three first samples have undergone changes but not in the same degree (ignoring the fact that they taste like the same kind of wine). These three samples are turbid. The unpasteurized wine contains a large amount of acid, and has lost more color. The pasteurized wine is flattish, but is less changed. The pasteurized wine which was in a partially filled but well-corked bottle shows signs of a beginning change.

As far as the same wines, pasteurized and not pasteurized, but in full bottles, are concerned, the tasters agree that the natural wine has a finer taste than the pasteurized sample. The difference in the color is not noticeable.

No. 2 (Same method of experimenting). The pasteurized wine which was exposed to the air is flattish and turbid. The wine which was not pasteurized, but exposed to the air, is deeply changed and more turbid than the first one. The heated wine which was in corked but half-filled bottles is turbid, flattish, and acid. In the full bottles the difference is very small.

The wine which was not pasteurized has a finer taste; the pasteurized wine has deposited more sediments in the bottles than the non-pasteurized.

No. 3. The pasteurized wine which had been exposed to the air is

flattish, but not acid; considerable sediment. The wine which had not been pasteurized is more deeply altered. The wine which was pasteurized in partly filled bottles is flattish and turbid, but not acid. In the full bottles the pasteurized wine appears to be richer in body but of more common taste; by moving the bottles, the pasteurized wine becomes turbid, while the unpasteurized wine remains clear.

The following conclusions can be drawn from these experiments:

1. That pasteurized wines stand the access of the air without undergoing such a radical change as wines which have not been treated in this manner; but nevertheless they assume, through prolonged contact with the air, a flattish taste and become sour and moldy even in closed vessels which are not completely filled.

2. That the fine and aromatic wines, if pasteurized and protected from the access of the air, have generally after this operation a more common taste than the unpasteurized wines which are preserved in the ordinary way. We have not yet been able to ascertain if the pasteurizing has an appreciable influence on the precipitation of the coloring matter and salts during sea voyages. We have noticed, however, already, that after performing this operation a deposit is formed, and that the color of certain wines decreases. It is, therefore, advisable to store them after pasteurizing in a cool cellar, and to rack them carefully, shutting out the air as much as possible. Without this precaution one would run the risk of sending off wines which would arrive at their destination more or less turbid.

AGING BY THE COMBINED USE OF SEVERAL PROCESSES.—Before subjecting any wine to the different processes which we have described, care should be taken to precipitate the matters which they keep in suspension, by a thorough treatment with finings. Artificial methods of aging should never be applied to the first-class red or white wines of the Gironde; because if even an early development of the bouquet is obtained, there is always the danger of destroying its most precious quality, their mellow taste. To-day the connoisseurs in wines do not look for wines which are dry and harsh to the palate, even if they possess a bouquet; such wines are only too frequently met with. They value particularly wines which, notwithstanding their age, have preserved their fruity, velvety taste and oily consistence, which can be preserved only by storing the wines in cellars with a regular temperature, and in air-tight vessels, by racking at the proper time, and by keeping the air off as much as possible, and by avoiding as much as possible the application of finings.

The wines which improve most by the successive applications of several of the above described processes are: First, the very harsh and deeply colored wines; second, the fortified wines which contain at least 18 per cent of alcohol; third, the sweet fortified wines which contain from 18 to 20 per cent of alcohol.

The fortified, dry, or sweet wines age very rapidly, if they are first agitated, then exposed to the sunlight, and afterwards subjected to a thorough treatment with finings; but it is important that they should be fortified as soon as the alcoholic strength decreases through evaporation, for if they should have less than 15 per cent of alcohol, instead of acquiring bouquet they would become "pricked." It is also often necessary to increase the sugar of the sweet wines which are aged in this way.

CHAPTER XI.

EMPTY BARRELS.

The influence of different kinds of wood on the durability of the barrels and on their fitness to resist the humidity of cellars; influence of various substances contained in the staves, which are dissolved by the wine. Preparation and preservation of new casks and barrels. Treatment of empty barrels, which have been used already; changes which they are liable to undergo; acidity, moldiness, rotting; how to contend with these changes; inconvenience of using casks which have undergone a change. Brandy barrels.

INFLUENCE OF DIFFERENT KINDS OF WOOD ON THE DURABILITY OF THE BARRELS, AND ON THEIR FITNESS TO RESIST THE HUMIDITY OF CELLARS—
INFLUENCE OF VARIOUS SUBSTANCES CONTAINED IN THE STAVES, AND WHICH ARE DISSOLVED BY THE WINE.

Oak wood yields to the wine several substances, of which the most important are tannin, gallic acid, mucilage, organic albumen, and several other substances which possess a pronounced odor and taste. All timber from this species seems to contain the same soluble substances; but there are, among the different varieties of oak, some which contain a much larger quantity of soluble substances than others. The Bosnian oak contains the largest amount of soluble matter. A short time after the introduction of this variety into France the wine makers began to fear for the future of their wines. They noticed the large quantity of dissolved matter which gave to the new wines a strong woody taste and much harshness. But to-day, thanks to a long experience, we know that staves which are made from this wood, far from doing any harm, improve the wine by promoting the settling of the lees. We know also that the odoriferous substances which they contain do not possess any disagreeable properties. However, the material for staves which is most valued on account of its agreeable odor, is that from the north of France—from Dantzic, Stettin, and from Angoulême. Casks which are made from American timber do not contain as much soluble matter as other varieties; but still they are considered by the French wine makers to be the least fit for storing wines and alcohols.

On aging, the wine gets rid of a large portion of the dissolved matters, which are neutralized by combining with various substances found in the wine. Thus the tannin, which contributes to the keeping power and clearing of the wine, is partly precipitated by combining with various substances contained in the wines or introduced with the finings. The organic albumen is precipitated chiefly by the alcohol, and thus also helps to clarify the wine. The odoriferous substances in the wood increase the bouquet of the wine. Upon the whole, the preserving of new wines in new casks of oak wood is favorable to their clearing, because of tannin and organic albumen contained in the staves; but it should be borne in mind that these wines should be transferred to the new casks immediately after leaving the fermenting vats, and before the after-fermentation is over; otherwise their bright condition would suffer, and they would acquire a strong woody taste which would last for several months. After a certain lapse of time the woody taste will disappear.

PREPARATION AND PRESERVATION OF NEW CASKS AND BARRELS.—New casks after leaving the coopers's shed have only one small gimlet hole;

this hole is made by the workmen to test the air-tight condition of the cask. New casks, which are destined to contain new wines, should be stored in a place which is not too moist. We should be equally careful not to keep them in places which are too well ventilated. In moist places the casks burnish and the hoops become rusty or rotten; in places which are too warm and exposed to dry air the wood shrinks and they get too dry, making it necessary to cooper them up well again before using.

The most convenient place for storing empty barrels is a dry cellar, which should be kept closed. The casks are placed on benches or blocks of wood; those of the lowest row with the bunghole upwards and those of the upper rows with the bunghole downwards, in order that the dust should not blacken the insides nor penetrate through the gimlet hole. If new casks are not used for several years it is advisable, in order to prevent the inside becoming moldy, to make the bunghole, and burn a piece of sulphured wick inside. Then keep the cask well bunged, and repeat this operation every six months.

The day before pressing the young wine in the fermenting vat, or before transferring it into barrels, if it is a white wine, the bungholes should be drilled out with a good wimble, and fitted with bungs wrapped in a linen cloth. Pour into each cask from one to two gallons of boiling water; then, drive the bung in again, and the cask or barrel is rinsed by agitating. The boiling water and the steam expand the air in the barrel, and in the pores and in the smallest fissures of the staves, making it thus possible to see the least flaw. After having thus rinsed the barrels, the water should be thrown out before it becomes quite cold; after that, the casks should be rinsed again with cold water, and drained. Before filling them with wine, it is advisable—if they are destined to hold red wines of the best quality—to moisten their insides with a glass of old brandy; in which case, care should be taken that all parts of the staves are reached. These precautions are, as a rule, sufficient for the preparation of the casks which are destined to hold red wines. We have already spoken of casking white wines.

If it should happen that very fine flavored or old wines have to be kept in new casks, the greater portion of the soluble matter in the staves could be extracted in the following way: In each cask a couple of gallons of boiling lye is poured. This lye can be made from ashes or potash; and in case these materials are not at hand, from any other alkaline substance, such as slaked lime, pulverized chalk, etc. It has been noticed that alkaline substances dissolve out of the staves a larger quantity of matter than pure water. After having rinsed the barrel or the cask several times with the lye, it is poured out, and the rinsing is continued with a new quantity. Afterwards, boiling water is used to remove the alkaline matter. This water is poured out while it is still hot, and replaced by a gallon or a gallon and a half of cold water, acidified by one fifth of a pint of sulphuric acid. After the treatment with acidified water, hot water is used to remove the acid. Again, before draining, the cask is once more treated with cold water. These various manipulations can be avoided by wine-seasoning the new casks which are destined to hold old wines, to do which, new barrels are first treated with boiling water, in the manner we have described above. Then they are filled with ordinary wine of the same color as that which they are destined to hold. For this purpose, also, ordinary white wines may be

used. In a fortnight these wines will absorb most of the soluble matter from the staves.

TREATMENT OF EMPTY BARRELS WHICH HAVE BEEN USED ALREADY; CHANGES WHICH THEY ARE LIABLE TO UNDERGO; ACIDITY, MOLDINESS, ROTTING; HOW TO PREVENT AND COMBAT THESE CHANGES.—As soon as a barrel has been emptied, it should be rinsed several times with water; care being taken to regulate the work according to the amount of lees which the wine contains. When the water runs off entirely clear, the barrel is drained for a few minutes; a small piece of sulphur wick is introduced through the bung-hole and burned; after which the barrel is put aside to dry. After twenty-four hours again a small piece of sulphur wick is introduced and burned; this time the barrel should be bunged as hermetically and as carefully as if it were filled with wine. The barrel having been treated in this manner, for some months will experience no change, provided it is kept in a cellar, the temperature of which is uniform, and neither too dry nor too moist. Should the necessity arise of keeping this barrel a long time without further use, it would be necessary to repeat the sulphuring every three months, and to keep it hermetically bunged. There are two methods of burning the sulphur wick in the empty barrels. The first consists in introducing the wick by means of a hooked wire, or, still better, on a small pan; when the sulphur has burned down, the pan is drawn back and the barrel bunged. The other way to do it is to cut out a piece of the sulphur wick about four to five inches long; one end of this piece is cut into a bird's-mouth joint and the wick on this end cleaned from the sulphur which adheres to it; the other end is now lighted and introduced into the bung-hole, while the portion of the wick which is free from sulphur is pressed with the hand against the side of the bung-hole; in the meantime the bung, which has been previously wrapped in a linen rag, is introduced into the bung-hole and hammered in. That the combustion of the sulphur is going on in the interior should be ascertained by applying the ear to the staves of the bulge. A hissing sound produced by the droplets of sulphur which fall on the inner walls of the bulge should be heard. If no sound is heard it means that the wick has ceased to burn; in such a case it would be necessary to ascertain this fact by taking out the bung cautiously.

By this method the combustion of the sulphur is going on in the barrel without the surrounding air having access to it; the result is, that with the same quantity of sulphur it is possible to impregnate the barrel with a larger quantity of sulphurous acid than by burning with the bung open. This makes a barrel fit to keep longer without undergoing any change, because the oxygen of the air which it contained is more thoroughly exhausted than when the air had access. The use of this method, however, offers some inconveniences. As the burned wick remains sticking to the walls of the bung-hole, there is always danger that it may fall into the cask and communicate to the wine a disagreeable taste, unless great care is exercised in taking out the bung; sometimes, also, it happens—if the casks are not bunged with great care—that the rag around the bung burns, and that then the gas and the expanded air find an outlet and carry with them the flame of the wick, which carbonizes the walls of the bung-hole. These are the reasons which generally make people use the wickholder.

Always avoid leaving the casks empty for several days without rinsing them; they should be cleaned without delay, as soon as the lees are emptied. The casks should be drained in the cellar on benches; if they are allowed to drain in the sun, particularly if they have not been previously sulphured, the action of the heat transforms the alcohol which adheres to the interior sides of the staves rapidly into acetic acid, and barely a few hours suffice to acidify the air which they contain, and even the interior surface of the staves.

CHANGES WHICH THE CASKS MAY UNDERGO; THEIR TREATMENT; INCONVENIENCES OF USING CASKS WHICH HAVE UNDERGONE A CHANGE.—The casks which, after having been emptied, are neither rinsed, sulphured, nor bunged, are apt to undergo various changes, which make them more or less unfit for holding wine, particularly wine of high quality. These changes are: flattish odor, acidity, mold, and rot.

Flattish Odor—Origin and Treatment.—The cause of the flattish odor is due to the liberation of carbonic acid, which is generated in the cask. This odor is chiefly met with in casks which have remained bunged without previous cleaning. It reminds one, more or less, of stagnant lees which are slightly acid. The sulphur cannot burn in such casks. It is very easy to expel the carbonic acid. As this gas is much heavier than the air, it suffices to place the cask over the drain, with the bung-hole downwards, in order to renew the air completely. The cask is allowed to remain in this position for one or two hours, and is then rinsed carefully. Should the cask be acid, and smell flattish at the same time, the following treatment should be adopted, in order to rid it of acidity.

Acidity—Cause, Origin, and Treatment.—This alteration is produced, if an empty cask remains several days without being attended to. The staves of the cask, which are impregnated with wine, become acid on coming in contact with the air, which latter oxidizes the alcohol, and transforms it rapidly into acetic acid. The higher the temperature the more rapid is this transformation.

Under such conditions the interior of the cask has a very decided acid odor. The treatment of this evil consists in neutralizing or in extracting completely the acetic acid which has sometimes penetrated deeply into the pores of the wood. The following shows how this may be accomplished: After having rinsed the cask with water, a hot lye solution should be applied; this solution may be prepared from wood ashes (preferably from the ashes of vine shoots)—potash quicklime. The cask should be rinsed several times with this lye, which should be thrown away before it cools completely; then, if it is possible, the cask should be filled with fresh water, which should remain in it three or four days. After that the cask should be emptied and rinsed in the ordinary manner. The water should not be allowed to remain longer in the casks, for it would become slimy, and in the end putrefaction would set in.

Moldiness—Cause, Origin, and Treatment.—The mold which forms on the inside of the casks is due to their prolonged contact with a moist atmosphere, as commonly met with in the majority of cellars. Thus, whether the bungs have been neglected, whether there are defective staves, or even if the hoops do not fit tightly, this moist air penetrates them and, even though sulphur has been burned in them, moldiness sets in it at last. If they have not been sulphured the mold appears much sooner.

The mold is a kind of whitish moss consisting of microscopic fungi, the bad taste and disagreeable odor of which are due, it is generally supposed, to the presence of an essential oil. Moldy casks can be recognized by their odor. The simplest way to treat casks which are thus affected is to take out the bottom and examine them; if the moldiness appears to be superficial, it can be easily removed with the help of water and a stiff brush; if, after thorough rubbing and washing, the inner surface of the staves assumes again the natural color of the wood impregnated with wine, this is a sign that the wood has not been attacked; it is sufficient in this case where the bottom has been taken out, to place the cask on its side, and let it dry; it may even be exposed to the heat of the sun without fear of acidity. When thus cleansed, the bottom of the cask is replaced, and the whole rinsed in the ordinary way. If, on the contrary, the staves remain brown after washing and rubbing, they are more than moldy—they are more or less deeply rotten.

Rotting—Cause, Origin, and Treatment.—Rotting is the decomposition of the wood. Its cause is the same as that of moldiness, viz., moisture. A cask whose inner surface is rotten cannot be used for holding wine. If the staves of a moldy cask show brown spots, they should be scratched off, and all the wood removed which is not sound or which is without its natural color; without this precaution, whatever may be done, it will be only possible to conceal the bad taste without removing it. If a cask needs to be entirely peeled of its moldy skin, the inner side of the staves should be slightly carbonized before putting on the finishing touches. It is hardly necessary to add that the use of doubtful casks for wines of good quality should be avoided, even if the casks have been previously treated in a suitable manner. For if the wine remains a long time in the casks it penetrates deep into the pores of the wood. Thus, one is apt to spoil the wine, and to lose, by ill applied economy, the value of a good barrel of wine. Such inferior casks, if it is at all necessary to make use of them, should be employed for holding only the poorest kind of wines.

BRANDY BARRELS.—These barrels do not require other manipulations, after having been emptied, than to be bunged and removed from the influence of humidity; the alcohol which impregnates their staves is sufficient to preserve them. It is detrimental to drain and dry them completely. If they have remained empty for a long time they are slightly moistened with alcohol in order to prevent molding. The new barrels which are destined to hold brandies are rinsed and drained for at least twenty-four hours. When their staves are dry they are moistened with one or two glasses of alcohol, which is allowed to remain in them; they are then securely bunged and shaken well. We should avoid leaving water in these barrels, for if once the alcohol is evaporated they undergo, if exposed to humidity, the same changes as the wine casks. It is important that the casks which have been moistened with alcohol should be placed outside the rooms where the wine casks are stored, in order to make the sulphuring of one of them by mistake impossible; such a mistake may produce a terrible fire, particularly if the casks were lately emptied.

All these remarks apply to casks which have been already used for holding alcohol or which are destined for new brandies; that is, for those brandies which have just left the still and which are not to be sent off

immediately. Should the necessity arise of sending off brandies in new barrels it will be useful—in order to prevent the “woody” taste—to leave the casks full of water for three or four days and to treat them afterwards in the same manner as we have shown above for wines. Ordinary wines may be kept in barrels which have already contained brandy and even olive oil, provided it was not rancid; but we should avoid the use of such casks for wines of high quality.

So far as barrels are concerned which have been used for rum, kirsh, vinegar, absinthe, bitters, or any other liquor of penetrating odor, they are entirely unfit to hold wines, on account of the essential oils, the entire removal of which is quite impossible.

CHAPTER XII.

LIQUEUR, OR SWEET WINES.

General composition. Various processes of vinification. Treatment. Aging. Clarification. Manufacture of “liqueur” wines with the help of similar wines. Artificial sweet wines. Vermout.

SWEET WINES are those which, after having gone through their violent fermentation, either in tanks or in casks, still contain a certain quantity of sugar in solution. In order that such a result may be reached, it is necessary that the must should be very rich in sugar. It should have from 16 degrees to 25 degrees, according to the Baumé spindle. The wines uniting these conditions contain from 15 per cent to 16 per cent of pure alcohol, without having been fortified. The sugar they contain gives them a higher specific gravity than that of water. By extension of the term, foreign wines, which do not contain an appreciable quantity of sugar, but which have been strongly fortified, are also called sweet wines. Such are *ports*, dry Madeiras, sherries, etc. These, in reality, are dry, but have been artificially fortified with alcohol. Some varieties of these wines are found, to which a small quantity of sugar has been added, in order to destroy their dryness and render them more mellow; notwithstanding this, they do not taste sweet. There are other varieties which are fortified while they are still a little sweetish.

The process employed in making these wines varies in each establishment.

First process.—The density of the must may be augmented in a natural way by allowing the grapes to become overripe. In warm and dry climates the berries dry up partially, and a certain portion of their water evaporates.

Second process.—In cooler and moister climates the grapes first rot and then are wasted by the sun; in this case, also, their water evaporates. This can be seen in the vinification of the wines of Barsac, Monbazillac, etc.

Third process.—In some vineyards of Spain, the drying of the grapes is hastened by twisting the stems of the bunches; the rising of the sap is thus stopped.

Fourth process.—In Andalusia the must is concentrated by ebullition. This process is also used in the south of France.

Fifth process.—After the well-matured grapes are picked, they are dried

on screens, or on straw in the sun; they are not pressed before their skins become wrinkled. In this way in Germany, Hungary, Alsace, etc., the *straw wines* are made.

Sixth process.—The grapes are dried in an oven or in a drying stove.

Seventh process.—Alcohol is added to the must before the fermentation has started, so that the liquid contains from 18 to 20 per cent of alcohol; in this way, by preventing fermentation, the saccharine matter is preserved.

Eighth process.—Lastly, dry wines are blended with syrup prepared from raisins or with concentrated and fortified musts.

The dry “liqueur wines,” that means those that are completely through with their fermentation, receive an addition of brandy, either after leaving the fermenting tank, or after their violent fermentation in the barrel is over.

TREATMENT OF SWEET WINES; THEIR CONSERVATION.—The various processes of vinification of sweet wines produce enormous differences in the character of these wines. The treatment should vary according to their alcohol-percentage. It should never be forgotten that the “liqueur wines,” be they dry or sweet, which contain less than 16 per cent of alcohol, require *the same treatment as ordinary wines*, if it is desired that they undergo no changes. Without this precaution they are *susceptible to the same influences*, that is, liable to ferment, to become turbid, and at last to become pricked.

In order that “liqueur wines,” be they dry or mellow, natural or artificial, may be preserved in storehouses with uneven temperature, in upright standing bottles, or in partly filled casks, it is necessary that they should contain at least 18 per cent to 20 per cent of alcohol. If they have this percentage, particularly if they still contain some sugar, a high temperature will age them, and they will keep quite well without requiring constant attention. The barrels should be quite full, but there is no need of filling them up oftener than once a month. But before subjecting them to these conditions it is indispensable to ascertain *exactly their alcohol-percentage*.

AGING.—As we have already said, a high temperature is favorable to the aging of “liqueur” wines, *provided their alcohol-percentage is not too much lowered by evaporation*, which must be ascertained and watched.

FINING.—The clearing of sweet wines may be effected in two ways: by the use of finings, or by filtration. Both processes are often used at the same time. The kind of finings most suitable for each variety of wine should be chosen. If the wine is dry, and contains a considerable quantity of alcohol—as, for instance, the Madeiras, ports, etc.—the clearing with substances which contain albumen, or the white of egg, is perfectly successful. If these substances cannot be had, fresh blood should be used, but that only with ordinary wines. When the wine is very syrupy, it should be tannified with an alcoholic solution of tannin, and then treated with a strong dose of pure gelatine.

This method is particularly useful with large quantities of liquid. When only small amounts have to be treated, they are filtered through paper, woolen strainers, or closed filters. In order to avoid too rapid

evaporation, the whole operation should be performed as rapidly as possible. Thus a perfectly clear liquid may be obtained.

These wines should remain undisturbed as much as possible, and be racked before sending away; for however clear they may be, it is seldom that they do not deposit a sediment, either on the bottom or on the walls of the casks. They age more rapidly in wood than in bottles.

IMITATION OF SWEET WINES WITH SIMILAR WINES.—The scarcity of certain foreign wines, their high price, the high custom duties which have to be paid on them, etc., have induced French wine makers and wine merchants already producing wines similar to those to adopt the processes of vinification which are used in foreign wine-growing districts.

In order to imitate sweet or dry wines, which are known in French commerce under the name of "*liqueur*" wines, it is necessary to have the various preparations and flavoring extracts on hand which are sometimes used in foreign wineries. These preparations are *saccharine matters*, extracted from the raisins or from the fortified musts; they are known in France under the name of *calabres*. They can be prepared with and without the application of heat.

Calabres Prepared Without the Application of Heat.—The must from very ripe grapes, having a specific gravity of 12 to 14 degrees, is fortified with enough alcohol to make the percentage 17. This is done as soon as the must is pressed; the alcohol stops the fermentation; if less alcohol should be added the must would begin to ferment. Other wine makers stop the fermentation of the must by means of sulphurous acid, and make preserved musts or unfermented wines. (Compare *Practical Method of Stopping the Fermentation of Musts*.)

Calabres Prepared With Application of Heat.—The making of these calabres consists in concentrating the musts by boiling. As soon as the must has left the press-room it is freed from the solid particles as much as possible (compare description of this operation in Book I of this work), and then concentrated in a boiler until it shows (being hot) from 20 to 25 degrees by the aerometer of Baumé; the foam should be skimmed off with care. After cooling, alcohol is added in the same proportions as in the previous case, or this concentrated must may be used for the making of unfermented wines.

Syrups are also made from grape juice whose acid has not been neutralized by boiling the must until it has from 30 to 32 degrees Baumé; but this kind of syrup is very colored and is only used for brandies and dry wines.

Syrup from Grape Juice whose Acid has been Neutralized.—This syrup is made in the following manner: The must is freed from its impurities by straining it through a basket, whose bottom is covered with several layers of straw. Then carbonate of calcium (powdered marble) or powdered chalk is stirred in. When the effervescence has stopped, that means when the tartaric, acetic, and malic acids are neutralized, the must is decanted and filtered from the sediment through blankets. There now remains nothing to be done but to clarify. For this purpose to twenty-two gallons of liquid two and four tenths pounds of blood or white of thirteen eggs are added. Blood is preferable. It should be well mixed; the pans which are used should be flat, and the whole operation should be conducted rapidly if it is desired to obtain colorless syrups. The foam should be carefully skimmed off and the liquid boiled down

until the Baumé spindle indicates 32 degrees. As soon as the boiling is done, the syrup should be allowed the least possible time to remain in contact with the air, for it very easily becomes colored. It should be kept in barrels completely filled. If the syrups are made in deep pans they assume a fawn-colored tinge.

For the same purpose, also, saccharine matters which are foreign to grape-juice—such as the *juice of the sugar cane, the syrup from white refined sugar, a mixture of candy-syrup with white wine, sugar-cane molasses, and honey*—are sometimes used. All of these substances should be mixed with alcohol or with old brandies.

FOR COLORING the deep-colored wines of the Roussillon, caramel, richly colored and aromatic alcoholic infusions or tinctures, of which we shall give the composition further on, are used.

In order to impart a taste of old wine, an *alcoholic infusion of the green peel of walnuts* is used; this infusion is made by pounding walnuts, which are allowed to turn brown in the air during twenty-four hours, on which is poured per each two and two tenths pounds, nine tenths of a quart of brandy (58 degrees); the infusion should be allowed to stand for three months before it is drawn off; the older the infusion is the better it fulfills its purpose. The same purpose can be attained by the alcoholic infusion of the roasted shells of bitter almonds.

In order to obtain this infusion, the shells of the almonds are crushed and roasted either in a coffee roaster or in a furnace. When their color has turned russet, they are thrown quite hot into a barrel with a large bung-hole, and alcohol of 65 degrees is poured on them without allowing them to become cold. The proportions should be half a gallon of alcohol on three and three tenths pounds of shells. The mixture should be well stirred and allowed to stand at least a month before it is drawn off. Aging improves the infusion; this infusion can be replaced by one of roasted millet grass. The millet grass is roasted in the same way as the almond shells. Afterwards it is crushed, and while still hot, alcohol is poured on it and the mixture stirred.

BOUQUET.—We refer the reader, as far as the alcoholic infusions of iris, raspberries, etc., are concerned, to the chapter on *Artificial Bouquets*. We shall speak here of the aromas, whose mode of preparation we have not described.

Tincture of Calamint.—The tips of the stems and of the leaves of calamint are put in a barrel with large bung-hole, or in any other vessel, and digested with alcohol of 85 degrees strength for a fortnight. The leaves and stems of the calamint should not be pressed together in the barrel. The roots of *Calamous aromaticus* fulfill the same purpose, and the extract is obtained in the same way, with the exception, however, that the roots are cut into small pieces.

Tincture of Cachou.—Pulverized cachou, five ounces; alcohol of 85 degrees, half a gallon. The mixture is allowed to stand for a fortnight before drawing off; care should be taken to stir this from time to time, in order to facilitate the solution of the cachou in the alcohol.

Tincture of Cloves.—Crushed cloves, one pound; alcohol of 85 degrees, three quarts. Same treatment as for the preparation of the cachou tincture, but in this case eight days of infusion are sufficient. These tinctures of cachou and of cloves are more aromatic if they are prepared

at a temperature of 100 degrees than if they are made at a lower temperature.

Elder Blossoms.—These blossoms are mixed with powdered sugar, which, after a fortnight or a month, becomes impregnated with their perfume. This perfume can be extracted by dissolving the sugar in a small quantity of water. Sometimes a small bag, which is filled with these blossoms, is suspended through the bung-hole in the wine; but in this case, the flowers must remain in the wine longer than one month.

Essence of Tar.—Three quarts of brandy of 58 degrees, in which a pound of the best tar has been mixed, are slowly distilled in a sand bath, or in a water bath from a small retort. Not more than two quarts should be distilled; the distillate should be preserved in well corked bottles.

Infusion of Coffee with Tar.—Coffee is roasted in the usual way; in the hot infusion, one fourth of its bulk of liquid tar is poured; this tar should be prepared by dissolving good tar in double its weight of alcohol of 85 degrees.

The various preparations which we have described should be stored in places adapted to their nature, namely: The sweet and non-alcoholic liquids in cool cellars and in closed vessels; the alcoholic liquids in store-rooms or ordinary cellars.

PRACTICAL METHODS.—For the maker of “liqueur” wines, it is indispensable to have before his eyes *typical and genuine samples, new and old*, of the wines which he has to imitate, in order to enable him to ascertain: 1. Their composition; 2. Their alcoholic percentage; 3. Their specific gravity; the changes which time makes them undergo; their flavor; their bouquet, and their peculiar taste.

In order to imitate these types, the wine maker has to look among the “liqueur” wines for those which resemble most the former. In France, these wines are found only in Roussillon, in Languedoc, and in the Provence.

The best types among the white wines are the *Muscats*, which Rivesaltes produces; Frontignan and Lunel follow. The *Muscatelles* (or *Petits Muscats*) which are made in great quantities in the vineyards of the Héraults, in the Provence, in Roquemaure, in Ciotat, fulfill the same purpose, but they are very much inferior to the Muscats. These wines are used for imitating *Malaga*, *Malvoisie*, etc., by means of the various preparations which we have just enumerated. If the French Muscats date from a good year, if they are well made and strongly fortified, and if they have remained from eight to ten years in the cask, they can, without any other addition but of alcohol, bear comparison with the foreign Muscat wines, and are sometimes even superior to them. The artificial Muscat wines which are made from ordinary white wines by flavoring them with elderberries or elderflower extracts, do not give good results. They cannot be compared even with the Muscatelles.

Artificial Wines.—The advice which we have given in the preceding paragraphs, gives, if followed, excellent results; but these results come pretty high to the wine maker, particularly if the best varieties of wines which we have mentioned are chosen. Many people are hunting, not for *excellency*, but for *cheapness*; it is on this account that most of the firms of Certe, which make a specialty of the liqueur wines, have lost their reputation by *manufacturing* these wines at a very low price. This

came about in the following manner: The great firms which made a specialty of this branch of the wine industry, saw their existence threatened by rival merchants, who offered wines at wretchedly low prices. They were thereby compelled to produce merchandise which could be sold at the same price, or lower. However, the wines which are made in Cette, or in its neighborhood, should not be sold by reliable firms *as foreign wines*. Let it not be understood that all liqueur wines which come from abroad are of irreproachable quality. Then, too, there are frequently sold to us very ordinary wines, sweetened with poorly prepared musts, having a doughy taste, and arriving in a turbid condition. There are many among them which are colored artificially with molasses, caramel, etc. The consignors are allowed to clarify them by filtration, before they leave the warehouse; this is done by the foreman cooper, who has the wines in the vaults of the custom house in charge. Thus they may arrive in a clear condition.

But the ordinary wines from Cadiz, Madeira, etc., are far from being equal to the best brands of similar French wines. Aside from that, certain Spanish firms, in order to be able to compete with French wines, *manufacture* these wines from the ordinary country wines, with the help of syrups, *caramel* (which they use extensively, or, rather, misuse), and alcohol. In this way they produce a mixture of the kind we are going to speak of. Unfortunately, these artificial mixtures enjoy some prestige on account of arriving directly from the producing country. Nevertheless, sensible purchasers are not deceived, and pay only for the real value of the wines.

The *artificial "liqueur" wines*, or *imitations made out of dissimilar wines*, are concocted in the following manner: White or red wines, which are not acid, and which have no defects, are taken. Among the white wines those are chosen which have the highest alcohol-percentage, and which are the cheapest; among the red wines those are chosen which have a frank taste; if it is possible, they should be first fortified on the premises of the proprietor—but this only when the fermentation is over.

These wines have, then, on the average, from 18 to 20 per cent of alcohol. They should be kept in places which have a very high temperature; the barrels should be only partly filled and should be exposed to the sun; they age thus very rapidly, but in order that they should keep without undergoing detrimental changes, it is necessary that their alcohol-percentage should not go below 18.

M. Pasteur recommends keeping these wines in well corked and only half filled bottles; these bottles should be exposed to the sun under glass sheds. It is certain that under such conditions they would age more rapidly, for the temperature of the wine could be raised higher by this method than by the usual method of keeping in barrels; the oxygenation would also proceed more rapidly; but if the wine has less than 18 per cent it is liable to become "pricked."

If sweet wines have to be imitated, the artificial wines are sweetened with "calabres" prepared with the application of heat. If their specific gravity is required to be high, syrup made from raisins is added, in order to make their specific gravity equal in saccharine to the typical wine. Then the bouquet is imparted to them by intelligently using the tinctures and preparations which have been described above. Color is imparted to them with the help of the infusions we have already mentioned. To imitate Muscat wines elder blossoms are used; but

neither of the preparations made by the use of these flowers can replace the ordinary *Muscatelles*.

Still, notwithstanding the inferiority of the wines which are manufactured from wine dissimilar to that to be imitated, there are authors, who call themselves œnologists, who profess that, for making "liqueur" wines, it is not absolutely essential to use natural wines. And this method is what several firms in Paris are practicing—making *entirely artificial wines*, in the composition of which not a drop of grape-juice enters. In this case the wine is replaced by weak brandy, which has, on the average, 20 per cent, and which has been diluted with the same quantity of tartar solution. This latter is water, in which there have been dissolved either seventy-five grains of cream of tartar (while hot), or thirty grains of tartaric acid, dissolved cold.

To these weak brandies some of the preparations which we have enumerated are added; they are then sweetened with cane sugar, glucose syrup, or with equally adulterated grape syrups.

These preparations do not contain anything unwholesome. They are liquids composed merely of water, alcohol, saccharine matters, tartaric acid, and flavoring extracts, which, with the help of a label and much credulity on the part of consumers, pass for the wines the general and unadulterated types of which the majority of consumers have never tasted.

VERMOUT.—In order to make a good vermouth a white wine should be taken, possessing as frank a taste as possible. With this wine an infusion is made, according to the rules we are going to give, of various aromatic plants, of which wormwood is the most important. The best vermouths are made in Italy.

In the trade several varieties of vermouth are distinguished: 1. The quinquina vermouths, after the Italian fashion, which have tonic, aperient, and vermifuge qualities. 2. The dry vermouths, called Madeira vermouths. 3. The mellow, aromatic vermouths. 4. The ordinary vermouths.

Vermouth shows many peculiarities, according as the wine used in its manufacture is new or old, dry or mellow; wine with an agreeable flavor, or with an earthy taste. The quantity and variety of the plants which were infused, the time of infusing, the methods of preparation, etc., have also an influence on the taste of the vermouth. Aside from these there are found varieties in the taste even of the vermouth of each individual manufacturer.

In order to make a good vermouth it is necessary:

1. That the white wines which are destined for this purpose should be old (at least one year), that they should have a frank taste, without harshness or tartness. White wines which continue sweet after the fermentation is over, should be preferred to dry wines for the preparation of mellow vermouths. If the wine be dry it would be necessary to add syrup.

2. These wines should be clear and their alcohol-percentage should be from 18 to 20 after fortifying. This condition is indispensable to the vermouths destined for export and for consumption in tropical countries.

3. That the plants should be carefully cleaned and the hard substances crushed and powdered.

4. The period of the infusion should be attentively watched—the higher the temperature the shorter the time required.

5. The wine after infusion should be racked, clarified, and again racked, and if its condition is not perfectly bright it should be clarified a second time or filtered and poured back into the cask. It should then be allowed to rest in a cellar possessing an even temperature.

Before shipping, these wines should remain in the cask at least a month. Newly made, they have a taste of weeds, which disappears with time. The vermouths which are six months or a year old are far superior to the younger ones.

Firms which make a specialty of vermouths should have certain casks for containing vermouths which are clarified and ready. The oldest should be sent off first, and in proportion as the casks become empty new vermouth is made in order to give it time to age. After complete clearing and allowing to remain a long time in the casks, these wines improve, the combination of the aromas becomes more intimate, and they continue clear during the voyage. On the other hand, if they are sent off soon after making, even though they be perfectly clear, they become turbid and deposit a sediment during long voyages.

The recipes which follow are calculated for two hundred-gallon lots:

QUINQUINA VERMOUT.

White wine, of frank taste, old, and clarified, 18 per cent alcohol.....	200	gallons.
Wormwood.....	2	pounds.
Rosemary.....	2	pounds.
Red Peruvian bark (quinquina), or yellow, crushed and previously infused with one quart of alcohol of 86 degrees.....	4	pounds.
Rhubarb.....	$\frac{1}{2}$	pound.
Angelica root.....	1	pound.
Holy thistle.....	2	pounds.
Cowslip.....	2	pounds.
Veronica.....	2	pounds.
Alcohol infusion of Seville oranges.....	3	quarts.
Alcoholic tincture of iris.....	$\frac{1}{10}$	quart.

The various plants, after a thorough cleaning and crushing, should be put into the wine. The infusion should be poured from one vessel into another, stirred, and allowed to stand thus from three to six days, according to the temperature; the mixture should be stirred several times every day.

The white wine chosen for this purpose is dry or mellow, according to the vermouth desired. Dry vermouths require dry wines, and sweet vermouths mellow ones. If it is not possible to obtain a sweet wine, the vermouth should be sweetened after infusion, by adding forty pounds of refined sugar to each two hundred gallons, and two gallons of alcohol of 85 degrees to the same. These quantities may be increased or diminished, if desired. The sugar should be previously crushed and dissolved in the wine, being frequently stirred to assist dissolution. The vermouths which are made according to this recipe, are very aromatic and good tonics. Consumers sometimes find them too bitter and too astringent, in which case it is necessary to age them before selling.

Astringent and Tonic Vermout made with Imitation Madeira.—We have made excellent vermouths of this kind with the following plants:

Assorted wormwood.....	2	pounds.
Costmary.....	1	pound.
Génépidés alpes.....	1	pound.
Origanum vulgaris.....	1	pound.
Cascarilla bark.....	1	pound.
Assorted tea.....	1	pound.
Angelica root.....	1	pound.

Crushed coriander	4 pounds.
Cinnamon	2 pounds.
Calamint	2 pounds.
Gentian	1 pound.
Rasped nutmeg	$\frac{1}{2}$ pound.
Tincture of iris	$\frac{1}{10}$ quart.
Fresh slices of Seville oranges	5 pounds.
Galanga	1 pound.
Tormentil	$1\frac{1}{2}$ pounds.
Cloves	1 pound.

Two hundred gallons of imitated Madeira wine.

MUSCAT VERMOUT.

Assorted wormwood	2 pounds.
Elder blossoms which have been assorted and mixed a week before with eight pounds of powdered sugar	4 pounds.
Crushed coriander	9 pounds.
Nutmegs	1 pound.
Cinnamon	2 pounds.
Alcoholic tincture of iris	$\frac{1}{10}$ quart.
Sweet orange peels, well pulverized	6 pounds.
Angelica root	1 pound.
Galanga	1 pound.
Germanda	2 pounds.
Cloves	1 pound.
Quassia	$\frac{1}{2}$ pound.
True acore	2 pounds.
Lesser centaury	2 pounds.
Elecampane	2 pounds.
Holy thistle	2 pounds.

For this variety of vermouths, sweet wines are preferred. The Muscat wines are suitable for this purpose; in case they cannot be had, syrup should be added—preference being given to neutralized raisin syrup. The latter should be as little colored as possible; raw cane sugar can be taken, or even refined white sugar.

ITALIAN VERMOUT.

Wine	220 gallons.
Wormwood	2.6 pounds.
Fresh oranges, cut in very thin slices	50 oranges.
Holy thistle	2.6 pounds.
Calamint	2.2 pounds.
Angelica root	0.4 pounds.
Cinnamon	2.2 pounds.
Nutmegs	1.4 pounds.
Gentian	1.3 pounds.
Germanda	2.2 pounds.
Lesser centaury	2.2 pounds.
Elecampane	2.2 pounds.

Some manufacturers do not make use of the last three plants.

This vermouth, though of good quality, is inferior to those which are made according to the former prescriptions.

Some manufacturers have a practice of coloring the vermouths with caramel. Others, instead of infusing the plants in white wine, infuse them in alcohol, and then pour the alcoholic infusions into the white wines. Aside from the objection that the astringent principals are not dissolved, the chlorophyl of these plants gives to these infusions a dark green color. Vermouths which are made in this way are, too, more liable to deposit sediments. First class vermouths should have the *natural color of white wine*, viz.: light amber.

TREATMENT OF THE VERMOUTS.—Vermouts should be treated exactly in the same manner as the liqueur wines, of which they are but a variety; if thought to be wanting in alcohol, it should be ascertained if the percentage of this ingredient is higher than 16. In order to keep well, the dry vermouts should be treated as ordinary wines; the sweet ones, if their alcohol-percentage is below 16, are liable to ferment again, particularly in warm countries. It is therefore necessary to fortify them so that they should contain from 18 to 20, or at least 17 per cent of alcohol. If they are too bitter, they should be blended with aromatic vermouts, which are made without using bitter substances, or they should be diluted with good white wines with frank taste, having at least 17 per cent of alcohol, and to which two pounds of white sugar per gallon have been added. In large establishments the astringent and aromatic substances remaining in the plants after the first infusion are extracted by a second infusion or by distillation.

STATEMENT OF THE IMPORT DUTIES

OF ALL THE PRINCIPAL COUNTRIES TO WHICH CALIFORNIA WINES,
BRANDIES, AND RAISINS ARE OR MAY BE EXPORTED.

Prepared by WINFIELD SCOTT, Secretary of the Commission.

Demands are frequently made at the office of the Board of State Viticultural Commissioners for a reliable statement of the tariffs of the principal foreign countries to which the viticultural products of California are at present, or may be in the future, exported, whether from San Francisco or from Atlantic ports. These statistics have been collected from the Consuls of the various countries, resident in San Francisco, and are therefore official and correct.

WINFIELD SCOTT,
Secretary.

ENGLAND AND HER COLONIES.

ENGLAND.

Wine, in casks, not over 30 degrees proof.....	1 shilling per gallon.
Wine, in casks, between 30 and 42 degrees proof.....	2 shillings 6 pence per gallon.
Wine, sparkling, under 30 degrees proof.....	1 shilling per gallon.
Wine, sparkling, between 30 and 42 degrees proof.....	2 shillings 6 pence per gallon.
All wines over 42 degrees proof.....	3 pence additional for each degree.
If sparkling and in bottles, if worth not over 15 shillings.....	1 shilling per gallon additional.
If over 15 shillings.....	2 shillings 6 pence per gallon additional.
Spirits.....	10 shillings 4 pence per proof gallon.
Spirits, not tested as in cordials.....	14 shillings per gallon.
Spirits, if bottled and in bond.....	3 pence per dozen.
Raisins.....	7 shillings per hundredweight.

CANADA.

Wine, up to 26 per cent alcohol.....	25 cents per gallon.
Wine, each degree between 26 and 40 per cent.....	3 cents per gallon.
Wine, sparkling.....	\$3 per dozen.
Brandy.....	\$2 per imperial gallon.

NEWFOUNDLAND.

Claret.....	40 cents per gallon.
Spanish reds and Italian.....	35 cents per gallon.
Malaga.....	35 cents per gallon.
Port and Madeira.....	\$1 65 per gallon.
Hock and Burgundy.....	85 cents per gallon.
Champagne.....	\$3 per gallon.
All other.....	12½ per cent and 90 cents per gallon.
Brandy.....	\$2 40 per gallon.

QUEENSLAND.

Wine, sparkling.....	10 shillings per gallon.
Wine, all other.....	6 shillings per gallon.
Brandy.....	12 shillings per gallon.
Brandy, coloring, over 35 per cent alcohol.....	12 shillings per gallon.
Raisins.....	2 pence per pound.

TASMANIA.

Wine, sparkling.....	10 shillings per gallon.
Wine, all other, in wood.....	6 shillings per gallon.
Wine, all other, in bottles.....	8 shillings per gallon.
Brandy.....	15 shillings per gallon.
Brandy, coloring, over 35 per cent alcohol.....	15 shillings per gallon.

NEW ZEALAND.

Wine, sparkling	9 shillings per gallon.
Wine, all other, except Australian, containing less than 40 per cent proof spirits.....	6 shillings per gallon.
Wine, Australian, containing not more than 35 per cent proof spirits.....	5 shillings per gallon.
Spirits in bottles, jars, etc.	16 shillings per gallon.
Spirits in bulk, jars, etc.	15 shillings per gallon.
Raisins and dried fruit.....	2 pence per pound.

NOTE.—There is a discrimination of 1 shilling per gallon in favor of Australian wine. The latest advices indicate that South Australian wine will probably be admitted free, the latter colony agreeing to admit New Zealand oats free.

NEW SOUTH WALES.

Wine, sparkling	10 shillings per gallon.
Wine, all other	5 shillings per gallon.
Brandy	12 shillings per gallon.
Brandy, coloring, containing over 35 per cent alcohol.....	14 shillings per gallon.
Raisins.....	2 pence per pound.

VICTORIA.

Wine, sparkling	8 shillings per gallon.
Wine, all other	6 shillings per gallon.
Brandy	12 shillings per gallon.
Brandy, coloring, containing over 35 per cent alcohol.....	15 shillings per gallon.
Raisins.....	2 pence per pound.

SOUTH AUSTRALIA.

Wine, sparkling	10 shillings per gallon.
Wine, all other, up to 35 per cent proof.....	6 shillings per gallon.
Brandy	14 shillings per gallon.
Brandy, coloring, containing over 35 per cent alcohol.....	14 shillings per gallon.
Raisins.....	2 pence per pound.

CEYLON.

Claret, bottled.....	1 rupee and 25 cents per gallon.
Claret, bulk.....	50 cents per gallon.
Sparkling wines.....	50 cents per gallon.
All other wines, bottled.....	1 rupee and 50 cents per gallon.
All other wines, bulk.....	1 rupee per gallon.
Spirits.....	4 rupees per proof gallon, and 50 cents for every 10 degrees over proof.

FIJI ISLANDS.

Claret and Australian wines, bottled or bulk.....	2 shillings per gallon.
All other still wines	4 shillings per gallon.
Sparkling wines	6 shillings per gallon.
All spirits	14 shillings per gallon.

NEW GUINEA.

Spirits.....	12 shillings per gallon.
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JAMAICA.

All wines.....	2 shillings 6 pence per gallon.
All spirits	10 shillings per gallon.

TRINIDAD.

Wines, sparkling.....	4 shillings per gallon.
Wines, all other, bottled, under 35 per cent alcohol	2 shillings 6 pence per gallon.
For each degree over 35 per cent.....	3 pence.
Wines, all other, in wood, up to 22 per cent.....	8 pence per gallon.
Wines, all other, in wood, up to 32 per cent.....	1 shilling per gallon.
Wines, all other, in wood, up to 42 per cent.....	2 shillings 6 pence per gallon.
For each degree above 42 per cent.....	3 pence.
Brandy.....	9 shillings per gallon.

BERMUDA.

Wine	20 per cent ad valorem.
Alcohol and all distilled liquors.....	4 shillings per gallon.

BRITISH GUIANA.

Wine, not over 26 per cent proof and not over \$2 per gallon.	50 cents per gallon.
Wine, bottled	\$1 per dozen pints.
Wine, all other	80 cents per gallon.
All spirituous liquors	\$2 50 per proof gallon.

CAPE COLONY.

Wine	6 shillings per imperial gallon.
Distilled spirits	2 shillings per imperial gallon.

OTHER COUNTRIES.

FRANCE.

Wine, from European countries	4 fr. 50 c. per hectoliter.
Wine, from all other countries	4 fr. 50 c. per hectoliter.
Alcohol and distilled liquors of all kinds	30 fr. per hectoliter.
Liqueurs	30 fr. per hectoliter.

GERMANY.

Wine, in casks, leather bottles or jugs of at least 50 kilogrammes gross weight	24 marks per 100 kilogrammes.
Wine, in small bottles or small leather bottles or jugs	-----
If sparkling, 80 marks per 100 kilogrammes; if still, 48 marks per 100 kilogrammes.	-----
Fruit wines and cider not included.	-----
Dried grapes	24 marks per 100 kilogrammes.
Fermented grapes	Same as wine.
Fruit brandies	180 marks per 100 kilogrammes.
Wash and singlings	Free.

ITALY.

Wine in casks	15 francs per 100 hectoliters.
Wine in bottles	30 francs per 100 hectoliters.
Brandy and other spirits in casks	25 francs per 100 hectoliters of pure alcohol.
If less than 80 proof	20 francs per 100 hectoliters.

RUSSIA.

Arrack, rum, brandy (French), and prune brandy	11 rubles per pud, brutto.
Grain spirits in bottles, liquors, kirchwasser, gin, whisky, and all spirits flavored with various fruits, also arrack, rum, French brandy, and prune brandy	75 copecs per bottle.

Remarks.—All grain spirits of all kinds in barrel and other large packages are prohibited for importation.

Wine of grapes—	-----
All imported in wood	3 rubles 50 copecs per pud, brutto.
Not mousseux	40 copecs per bottle.
All kinds mousseux	1 ruble 25 copecs per bottle.
Raisins	1 ruble 80 copecs per pud.
All duties payable in gold.	-----

SPAIN.

Wine, sparkling	150 pesetas per hectoliter.
Wine, all other	50 pesetas per hectoliter.
Brandy	20 pesetas per hectoliter.
Other distilled liquors	1 peseta per liter.
All preserved and dried fruits	1 peseta per kilogramme.

DENMARK.

Wine and fruit juice, unfortified, in bottles	13.44 cents per Pot.*
Same in barrels	2.73 cents per pound.
Grape wine, in casks	22 per cent ad valorem.
Grape wine, in stone jars	45 per cent ad valorem.
Liquors which cannot be graded	13.44 cents per Pot.
Same, 8 degrees strength or under	50.4 cents per eight Pots.
Same, for each $\frac{1}{4}$ degree over 8 degrees	.1 cent per eight Pots.

SWEDEN.

Wines, all kinds, not exceeding 21 per cent of alcohol	15 ore per liter.
Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in casks)	-----
-----	30 ore per kilogramme.

*4.7 Pots equal 1 gallon.

Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in other packages).....	65 ore per liter.
Wines, all kinds, over 25 per cent of alcohol.....	1 krone 50 ore per liter.
Brandy and spirits in casks and made from grapes in any other country than France.....	75 ore per liter of 50 per cent alcohol at 15 degrees Celcius.
Same in other packages (regardless of the percentage of alcohol).....	1 krone 11 ore per kilogramme.
Raisins.....	14 ore per kilogramme.
No allowance for tare.	

NORWAY.

Wines, not exceeding 21 per cent alcohol, in casks (16 per cent for tare).....	11½ ore per kilogramme.
Wines, not exceeding 21 per cent alcohol, in bottles.....	11½ ore per liter.
Wines, between 21 per cent and 25 per cent alcohol, in casks (16 per cent for tare).....	36 ore per kilogramme.
Wines, between 21 per cent and 25 per cent alcohol, in bottles.....	36 ore per liter.
Wines, over 25 per cent alcohol.....	Same as brandy 100 proof.
Brandy, in bottles.....	1 krone 60 ore per liter.
Brandy, in other packages, 100 proof (16 per cent tare for casks).....	1 krone 71 ore per liter.
Raisins (20 per cent tare on cases).....	12 ore per kilogramme.

BELGIUM.

Alcoholic liquors (distilled) used as beverage, up to 50 degrees strength; Gay Lussac at 15 degrees Centigrade, in casks.....	100 francs per hectoliter.
Same, each degree in excess of 50 degrees.....	2 francs per hectoliter.
Same, in bottles, regardless of strength.....	200 francs per hectoliter.
Wines (subject to Internal Revenue tax of 23 francs per hectoliter).....	Free.
Wines, over 18 per cent alcohol.....	Excess at the rate for alcoholic liquors.
Raisins.....	25 francs per 100 kilogrammes.
Dried grapes.....	Free.

SWITZERLAND.

Wine in casks, flasks, or jars.....	3 francs and 50 rupins per 100 kilogrammes.
Cognac and alcohol, in casks—for each degree of alcohol up to 100, as measured by Gay Lussac's alcoholometer.....	20 rupins per 100 kilogrammes.

HAWAII.

Alcohol and other spirits.....	\$10 per gallon.
Alcohol for medicinal uses.....	\$3 per gallon.
Brandy, etc. (between 30 and 55 per cent of alcohol and above 55 per cent pro rata).....	\$3 per gallon.
Wines (sparkling), quarts.....	\$3 per dozen.
Wines (sparkling), pints.....	\$3 per two dozen.
Wines (dry), quarts.....	40 cents per dozen.
Wines (dry), pints.....	40 cents per two dozen.
Wines (fortified), between 21 and 30 per cent alcohol.....	\$2 per gallon.

MEXICO.

Wine, red or white, in glass, no allowance for leakage or breakage.....	20 cents per kilogramme (net weight).
Same in wood.....	12 cents per kilogramme (net weight).
All other spirituous liquors under same conditions.....	25 cents per kilogramme (net weight).
Raisins.....	10 cents per kilogramme (net weight).

SALVADOR.

Vinous liquors.....	5 cents per kilogramme (gross).
Distilled liquors.....	30 cents per kilogramme (gross).
Raisins.....	10 cents per kilogramme (gross).

NICARAGUA.

Still wines.....	3 cents per pound (gross).
Sparkling wines.....	5 cents per pound (gross).
Distilled liquors (between 12 and 25 degrees alcohol).....	40 cents per pound (gross).
For every degree above 25.....	3 cents per pound (gross).

COSTA RICA.

Wines in bottles.....	3 cents per kilogramme (gross).
Wines in bulk.....	5 cents per kilogramme (gross).
Liquors (whose introduction is allowed in barrels).....	80 cents per kilogramme (gross).
Liquors (introduced in other packages).....	60 cents per kilogramme (gross).
Cognac and all brandies (in barrels or demijohns).....	80 cents per kilogramme (gross).
Cognac and all brandies (in other packages).....	60 cents per kilogramme (gross).
All dried fruits, including raisins.....	13 cents per kilogramme (gross).

GUATEMALA.

Red wines (in whatever packages).....	25 cents per bottle.
White wines (in whatever packages)	28 cents per bottle.
Sherry (in whatever packages)	28 cents per bottle.
All others	35 cents per bottle.
Brandy and all spirits up to 20 degrees Baumé	63 cents per bottle.
All dried fruits.....	7 cents per pound.

HONDURAS.

Wines, in cask or bottle.....	2 centavos per pound.
Brandies, in cask or bottle.....	30 centavos per pound.
All dried fruits.....	8 centavos per pound.

ECUADOR.

Wine	10 centavos per kilogramme (gross).
Brandy	Cane brandy prohibited.
Other brandy.....	25 centavos per kilogramme (gross).
Raisins	5 centavos per kilogramme (gross).

COLOMBIA.

Claret, in barrels or demijohns.....	2½ cents per kilogramme.
White wine, in barrels or demijohns.....	2½ cents per kilogramme.
All other wine.....	40 cents per kilogramme.
Brandy and distilled liquors.....	40 cents per kilogramme.
Raisins	20 cents per kilogramme.

CHILI.

Red wines, in bottles.....	\$3 per dozen.
Red wines, in wood.....	32 cents per liter.
White wines, in bottles.....	\$2 25 per dozen.
White wines, in wood.....	25 cents per liter.
Wine spirits.....	50 cents per liter.
Cognac	\$4 per dozen.
Cognac.....	42 cents per liter.

VENEZUELA.

Wines for medicinal purposes.....	1.25 bolivares* per kilogramme.
Bordeaux and Spanish reds.....	.25 bolivares per kilogramme.
All others.....	.75 bolivares per kilogramme.
Sweet liquors (not rectified)	1.25 bolivares per kilogramme.

* One bolivar equals 19.3 cents.

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